SEPTEMBER 2, 1943

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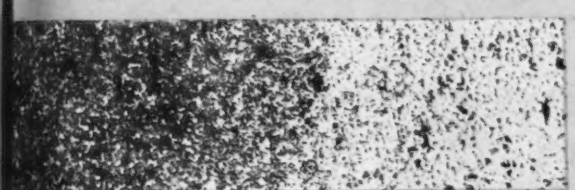
SEP 2 1943

IRON AGE

HOLDEN
Carburizing
BATHS

TYPICAL CASE ANALYSIS
r SAE and New NE STEELS

an one inch round bar carburized four hours at 1650° F. 100 X.



depth of case	.038 in.
depth of case to .35 carbon	.030 in.
depth of case in excess of .80% carbon	.015 in.
on content of 1st .005 in. turned from surface	1.034
on content of 2nd .005 in. turned from surface	.948
on content of 3rd .005 in. turned from surface	.807
on content of 4th .005 in. turned from surface	.639
on content of 5th .005 in. turned from surface	.509

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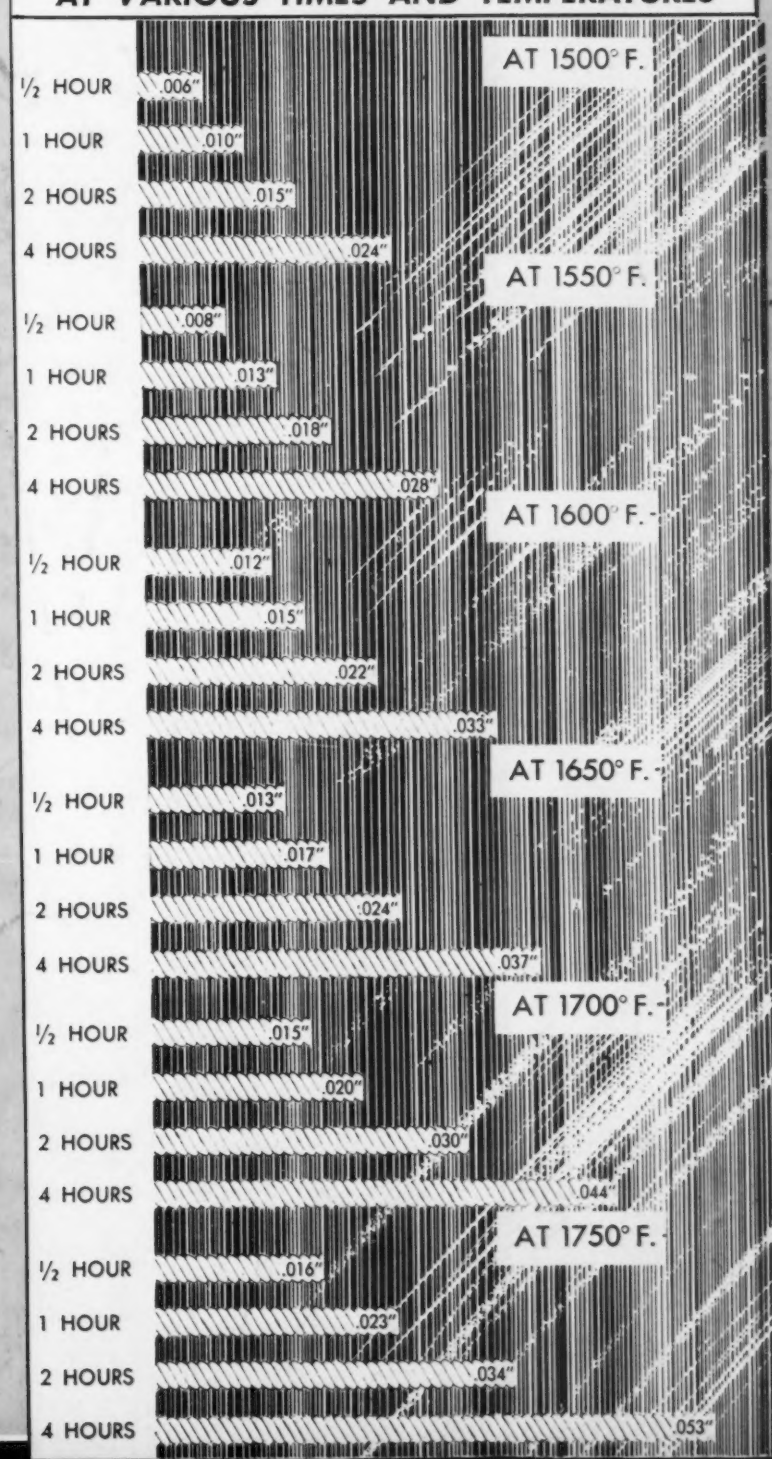
OF THIS 16 pg. ENGINEERING BULLETIN

CASE DEPTHS
AT VARIOUS TIMES AND TEMPERATURES



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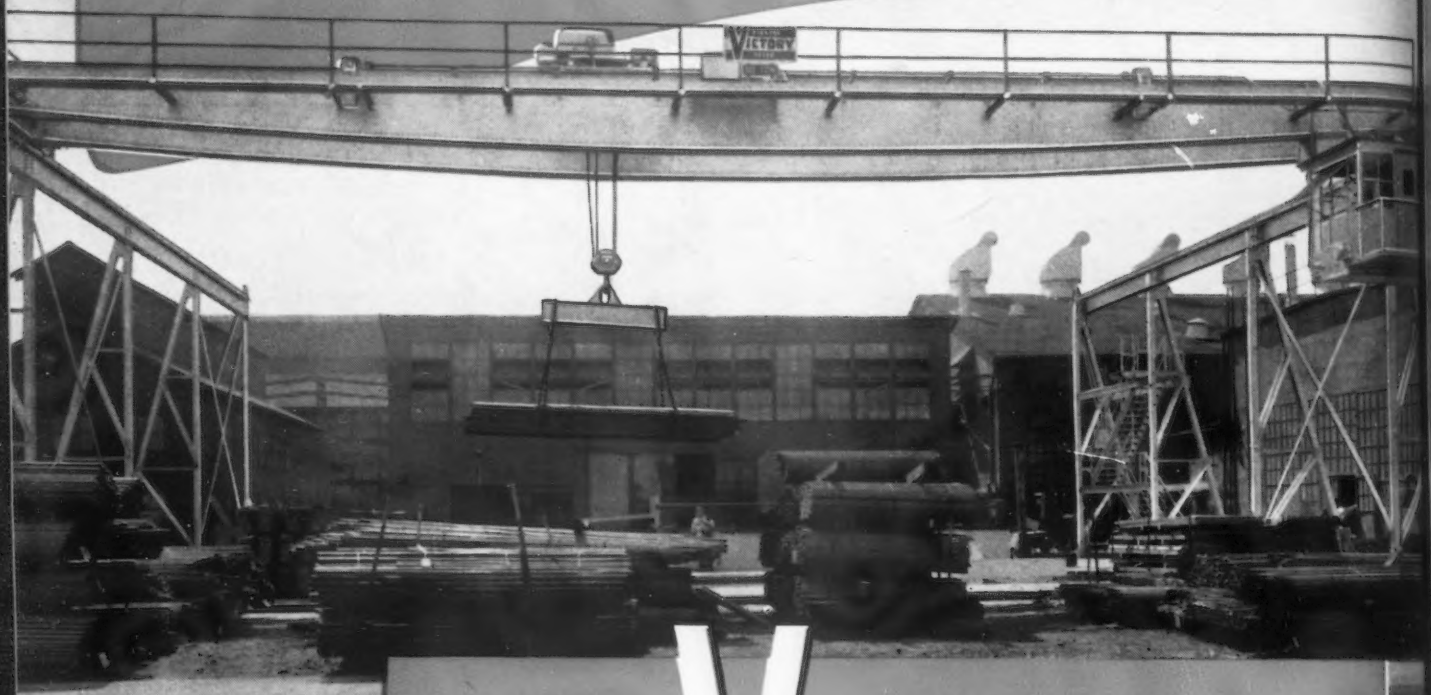

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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents. Annual Number, $2.

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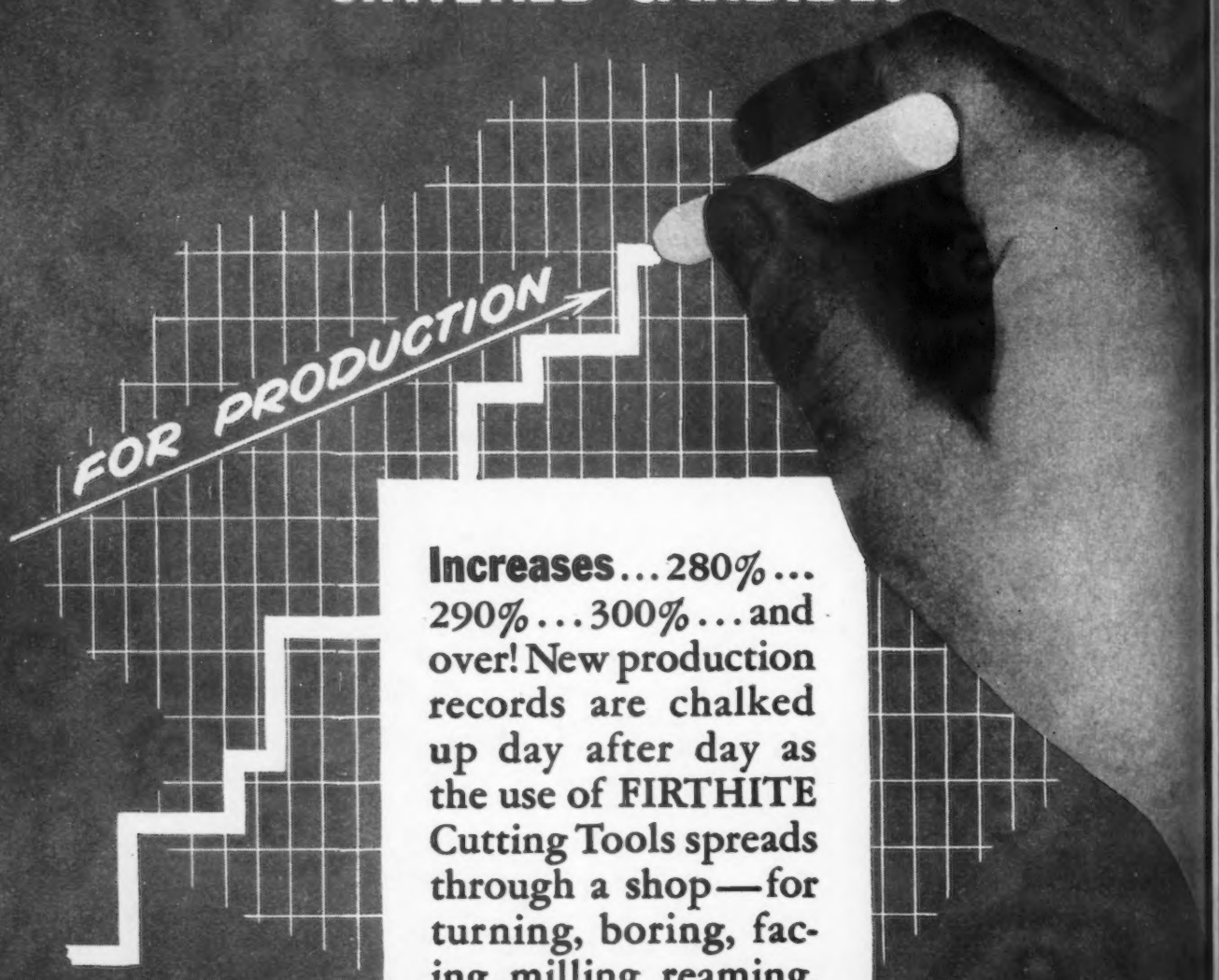

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Creating Post-War Employment

THERE is a good deal of "balony" in circulation regarding the creation of post-war employment. Many people are telling us how necessary it is to create it but few, of any, are telling us how to do it.

Some of the starry eyed boys in Washington, who, incidentally, are being moved further and further away from the throne, have told us how they *think* it could be done. "Just keep on taxing, spending and piling up debt," they say, "and everybody will have a job at good wages."

Of course, common sense tells us that this procedure would soon lead to Government being the sole proprietor and employer because the privately owned profit making companies in the black would be bled white to make up for the Government red. And most of us would rather continue to live under the red, white and blue than to chance the aforesaid red, white and black.

Government is not a creator of employment in the basic sense, never was and never will be. Some of the admirers of Sovietism among us may take exception to this and point to Russia. But whatever Russia has accomplished in the way of industrial development since the Czars has been based upon techniques of production and of management originated in capitalistic countries under private enterprise and borrowed thereform. Even the much advertised Stakhonovism or Russian "speed up" was long antedated by our Taylor System and incentive plans. There is a great difference between being an originator and being an adapter or an imitator.

Let us consider what it is that creates employment by going back and seeing how it has been created. How it has been created in the country, our country, that has made more employment and more highly paid employment per capita than any other country in the world.

Our employment was created by individuals. By men, not by Government.

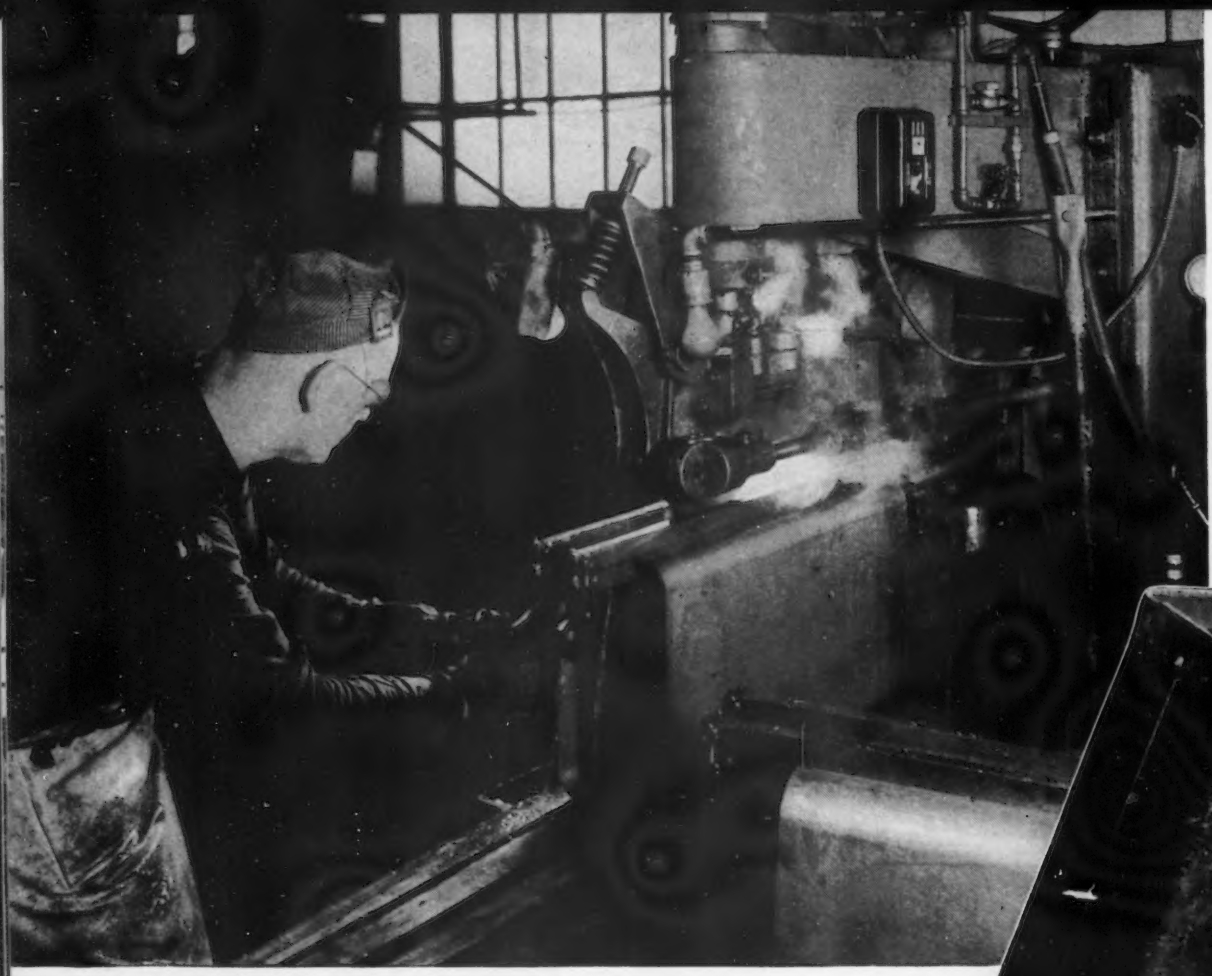
Government, outside of granting patents, did not help Thomas Edison to invent the incandescent lamp, the talking machine or the moving picture projector. Nor did Government develop, or even help to develop the great industries, employing millions that grew out of Edison's private initiative.

Government did not help Ford and Chrysler and other production geniuses of the automotive industry to build an employment of hundreds of thousands of people. It is true, however, that Government, in time of war, turned to these tools of production that private enterprise had provided and to the management that it had developed.

Government did not help Charles M. Schwab in putting together the United States Steel Corporation and later the Bethlehem Steel Company thus providing employment for thousands upon thousands of people. Nor did it suggest to George M. Verity that he should develop the American Rolling Mill Company from the embryo metal roofing shop in Cincinnati. Private initiative, organizing to put power to work through machinery; private initiative, and enterprise in merchandising useful products, not Government, built American employment.

It will be well to remember these things in the times to come.

J. H. Van Deventer



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The IRON AGE
SEPT. 2, 1943

NEWS FRONT

• Dwindling manpower and wishful thinking--these two conditions have stalled the war program on a plateau, are causing consternation in Washington, and may well imperil many phases of the Allied war effort.

• The war is in the bag, is the type of wishful thinking softening management and labor alike. The military, without exception, subscribe in no way to this optimism.

• Even Washington's WPB is being drained by an exodus of men back to industry to nail down post-war jobs. Partly because of this, WPB will soon announce widespread decentralization into the hinterland; many functions of the steel section may end up in Pittsburgh, other metals in inland cities.

• Manpower deterioration has cut utilization of aluminum and magnesium plants to 65 percent of capacity; requires hiring five to get one worker in shipyards and aircraft plants; resulted in not one man yet hired for a newly completed eastern lump ore and sintering plant, ad infinitum.

• Unrelenting bite of the draft and high school boys going back to school will soon further weaken the situation. Currently, high school boys constitute 45 percent of hot room labor in aluminum and magnesium plants, have bolstered industrial operations equally dramatically elsewhere.

• To top this crisis, drastic moves are imminent which will affect the lives of the least citizen.

• First: Within a few days the Buffalo Plan will be slapped down on several large industrial areas. This CMP for labor is controlled by a district citizen committee, apportions labor among war plants, kills off labor wastage in non-essential and duplicating activities, recommends to WPB withdrawal of war contracts that can't be handled by the district labor potential.

• Second: If utilization of the Buffalo Plan doesn't quickly show signs of alleviating the situation, it will be given very sharp teeth--this would be Universal Service, the final step in all-out participation of the citizenry in total war. Many a Washington bigwig looks for Universal Service laws before year's end.

• Many producers are none too sure that electric furnace capacity will be used at the possible sacrifice of open hearth capacity in the post-war period. In fact, several plants are experimenting with small open hearths as a possible competitive unit against the electric furnace for low tonnage orders of special purpose steels.

• Out of every 100 bombers produced in 1942, 17 were lend-leased. In fighter planes, 25 out of every 100; in light tanks, 22 out of every 100; in medium tanks, 36 out of every 100 went lend-lease. Overall lend-lease munitions shipments were 15 per cent of production.

• 50 percent of magnesium output goes into incendiary bombs. Fire damage to cities so far exceeds high explosive damage that magnesium estimates for incendiaries have risen 400 percent since the war's beginning.

• Countrywide "Brown Out" will go into effect by Sept. 15. Publicity, warnings, and cooperation of power companies will cut down much lighting, darken signs and other useless displays. Thus about 1 percent of yearly coal consumption will be saved, sizable quantities of oil, and, oddly enough, very worthwhile amounts of tungsten and molybdenum used in incandescent bulb filaments.

• Tapered rolling of steel for manufacture of steel propeller blades has been developed by American Rolling Mill Co. The taper, longitudinal, permits forming the blade without machining it to a taper as previously necessary, thus saving considerable machining time and steel.

• The tank program is sinking to its lowest ebb. Three plants will make medium tanks, against nine earlier. Light tanks will be made in one plant. Locomotive companies are switching from tanks to badly needed engines. The tank destroyer program is increasing; new models have greatly improved hydraulic transmissions, better suspensions.

• While current supplies of scrap are considered adequate, there is an undercurrent of fear that supplies will hit new lows this winter.

Increase of Performance of H

THE stress put on hot working tools depends on a number of factors which vary with workshop conditions. The effect of the design and condition of the machine tool and of the care and attention of the operator is well known, but influences such as lubrication and cooling are not sufficiently understood, an article by Dr. W. Hauffer, in the German periodical "TZ fur praktische Metall bearbeitung" points out.

All hot working tools are stressed mechanically and thermally and, depending on the working temperature, the one or the other stress can predominate. The mechanical stress put on hot working tools can be defined as a combination of abrasion and tensile forces, the article goes on. The material displaced in hot working slides over the surface of the tools and the resulting friction causes abrasion, especially on corners and edges. This stress can be visualized both as abrasion and as a welding of particles onto the surface. In nearly all hot working operations, conditions favor a welding effect followed by tearing; these conditions are high temperature, pressure, and difficulty of lubrication. Therefore a tearing or scouring is the main cause of tool wear.

Friction depends on surface conditions, on the metal worked, on the material of the tool and particularly on lubrication. Surfaces must be carefully descaled by brushing or other treatment. Polished tools will often show a considerable superiority over ordinarily ground tools. The working faces of all hot working tools should always be carefully ground and polished if possible. It must be borne in mind that small lines tend to concentrate stresses and favor the formation of fine surface cracks which will extend by the tearing-off of welded parts, by abrasion, and will finally lead to the loosening and breaking away of small sections of the surface. The tool will wear out very rapidly if particles from the work adhere. The hardness of the tool is important in preventing the welding effect. It is well known that welding of aluminum to hot working tools in aluminum work can be avoided by the use of particularly hard tools. Special surface treatment can also prevent adhesion.

Since clean metallic surfaces tend to stick together at high temperatures, friction must be reduced by the application of strong surface layers. Hard, black magnetic oxide of iron

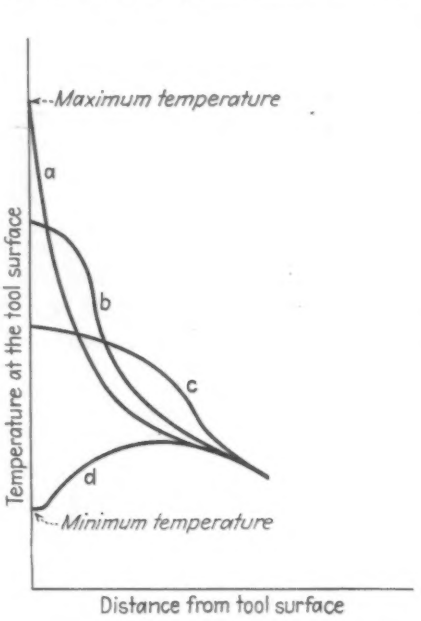

FIG. 1—Diagrammatic course of temperature at the surface of a tool (a) immediately after contact, (b) a little later, (c) still later, and (d) immediately after cooling.

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layers (Fe_3O_4) have performed well. They can be produced by burning of oil or by other means. Hard chrome plating was successful in flat drop-forging dies, but upon being heated to 660 to 750 deg. F., the chrome layer loses hardness and strength. Tools which are exposed to considerable surface temperature variations such as injection molds, cannot be chrome plated because the chrome layer will break loose. Therefore, hard chrome plating cannot be applied to high temperature tools.

Adequate lubrication is particularly difficult at the service temperature of hot working tools. In punching, graphite suspended in oil or water is being used successfully. In swaging dies for the working of non-ferrous metals, bees' wax, tallow, and similar materials are often used as lubricants. Oil must be very carefully applied to avoid explosions and damage to the die. In large forging dies, sawdust is used a great deal and lubrication is effected by the formation of a gas layer. The application of a highly volatile bituminous coal on the material in punching processes acts similarly. In patents application 703,161 (German) the use of a thin sheet of copper is suggested to effect good lubrication in the press-forging of nickel and other alloys which require particularly high temperatures. At temperatures below 2012 deg. F., sheets of a metal with a lower melting point than copper should be introduced between die and work.

Thus wear by abrasion requires especially careful descaling and wear by tearing the application of an intermediate layer of non-metallic or metallic character, lubrication with fats, oils, graphite or the formation of gas layers.

Tensile Stresses

Tensile stress depends, first of all, on the kind of process in which the tool is used. Also it depends on a

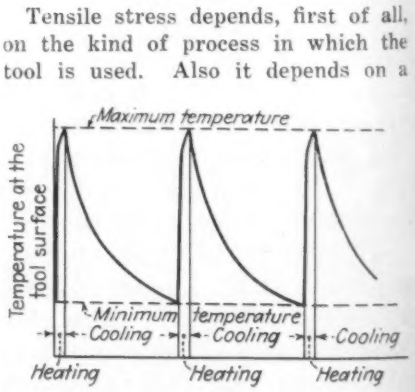

FIG. 2—Diagrammatic course of temperature changes at the tool surface.

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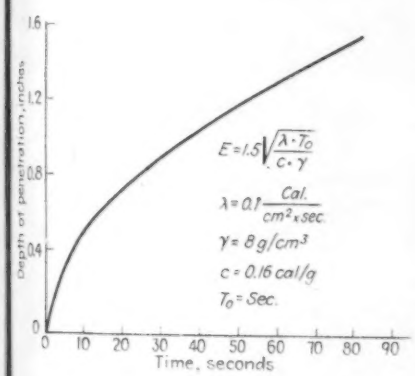
number of other factors. Deformation processes have only rarely been investigated; pressing, punching, drop forging, much more thoroughly.

Strength needs in punching depend very much on the process under con-

f Hot Work Tools . . .

. . . With an extremely thorough and methodical approach, this German article discusses the effect of friction, lubrication, oxide layers, heat, heating and cooling rates, original tensile strength and other factors, on the performance of hot work tools.

sideration, on the shape of the punch, on the rate and temperature of operation, the size and material of the billet, and on the cross-sectional ratio between billet and punch. In punching, the die is stressed by pressure. The tip of the die is likely to be upset if the pressure is too great or the strength of the tool is insufficient at the working temperatures. In extruding, the strength requirements of the tool depend on the process used (direct or indirect), on the shape and material of the die, its wall thickness, on the composition of the work and



on the pressing temperature. The die particularly is under pressure so that the edges of the orifice will deform easily. Tube mandrels, on the other hand, are often subjected to tensile stress by the material which slides past. They very often begin to neck just as in a tensile test if the heat resistance of the tool is insufficient.

In drop forging, the strength needs depend on the material, the temperature, the rate of deformation, and on the shape of the die. Here, corners and bulges are particularly unfavorable and likely to wear fast. Forging dies are subjected to a reversing impact stress. Strong local stresses are set up by the first blows since the material does not fully fill the die. The pressure can cover the total die area only when the whole shape is filled evenly. Pressures acting on the bottom and sides cause tensile stresses in the corners at the bottom of the die. These stresses very often cause the die to break. The fractures usually begin from the profiled side as force or fatigue cracks, but fractures beginning from the opposite side occur also.

In punching, shape and size of the hollow is usually precisely defined so that the pressure depends upon only the working temperature and the punching speed. According to some recent German work, in ordinary industrial use pressures in the punch are not a function of temperature. If punching speeds are increased by 35 per cent from 7.3 to 9.8 in. per sec. Hoffman observes an increase in the punching pressure of only 15 per cent.

LEFT

FIG. 3—Influence of heating and cooling periods upon the depth of penetration. In the formula given, depth of penetration (E) is the distance in millimeters from the hot wall in which the total temperature variation attains 1/15 part of the temperature variation between the maximum and minimum temperatures.

o o o

BELOW

FIG. 4—Tempering curves of some hot working steels. Steel No. 1 (2.8 Cr, 9.0 W, 0.3 V) was treated in oil at 2100 deg. F.; No. 2, with the same composition, was treated in oil at 1830 Deg. F.; No. 3 (2.5 Cr, 4.75 W, 0.7 V) was treated in oil at 2100 deg. F.; No. 4 (1.6 Cr, 0.7 Mo, 0.15 V) was treated in oil at 1740 deg. F.; No. 5 (1.0 Cr, 2.0 W) was treated in oil at 1580 deg. F.; No. 6 (0.7 Cr, 1.8 Ni, 0.5 Mo) was treated in compressed air at 1615 deg. F.

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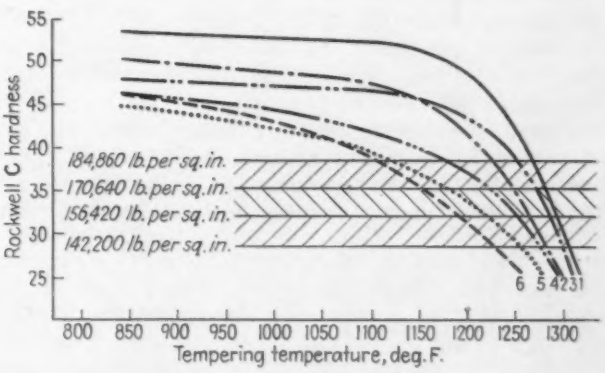
Also, friction increases with the rate of deformation, and can cause very considerable surface heating.

This thesis agrees with the observed fact that small profile dies as used in extrusion perform particularly badly owing to the greater pressing speed and friction. In extruding, wear is at present often reduced by the working of shorter bars. It is also reported by some workers that the strength requirements of dies with an angular orifice is 25 per cent below those of dies with a radius orifice. The use of angular dies, however, is possible only with materials of a low extrusion temperature, for example, aluminum, since edges are exposed to temperature effects and are likely to soften.

The excessive wear of dies in forging can be reduced by suitable preforging. Lubrication, as it has been recommended for the reduction of friction and tool wear, will have a favorable effect if suitably applied.

The surface of hot working tools is exposed to heat in operation. Stresses result, at the surface a thermal reversing stress is set up, and the tensile properties of the tools are influenced by the temperature effect.



It is frequently assumed that hot working tools would be stressed less when used at a more rapid rate owing to the shorter time of contact with the hot material. But it should be borne in mind that the pressure increase may be such as to offset the slight gain in temperature exposure.

Hot working tools can vary in respect to many functions, but they are all exposed to heat stresses. A definite amount of heat is transmitted to the

surface of the tool by the billet or bloom. The heat cannot at first be conducted away sufficiently fast. Fig. 1 shows a diagrammatical temperature distribution at the surface of a hot working tool. A thin surface layer is heated according to curve A. After a very short time an equilibrium is set up according to heat conduction curve B. From the surface of the tool, heat is given out to the body of the machine, to the chucking setup and to the air. In working pauses the tool face will lose heat. Heat must be always conducted away to an extent which balances increased heating or tempering. Because of the limited time which is available for cooling in operation, all tools have to be cooled artificially. Cooling media are compressed air and water.

Once equilibrium has been established, heat will constantly flow from the working face of the tool to the colder parts. This heat flow is modified by a heat wave on the warm side due to continuous heating and cooling. Such temperature differences and variations cause stresses which may rapidly wreck the tool.

The temperature differences and with them to some extent the stresses, will increase with the temperature of the work, with the heat transfer, and with the size of the tool, but decrease with its improved heat conductivity. For this reason large and heavy tools of hot working steels will tend to crack, particularly if those tools have a higher strength and lower toughness. These stresses are increased by notch effects or by abrupt cross-sectional changes. The sudden heating of the working face causes a relative heat expansion of the warmer surface layer. The colder parts cannot follow this expansion. In the workface, pressure stresses are set up which can, however, usually be relieved plastically, by the elasticity of the tool. Before use, cold tools must be preheated very carefully and as evenly as possible. Stresses caused by too rapid heating are responsible for the cracking of a great number of hot working tools, particularly in winter and especially on Mondays. The tools cool down completely over the holiday and are preheated too rapidly, insufficiently or unevenly. Often interior shrinkage cracks result which lead later to a fracture. Experience agrees with this theoretical discussion and a better all-over performance is secured if the tool is worked continuously until worn out, than when it is used intermittently.

In cooling, the heated layers contract to the extent of their temperature expansion. This causes deformation stresses which can be plastically relieved. Stresses can be even more increased when by rapid cooling the interior temperature considerably exceeds the surface temperature. The tensile stress caused by rapid cooling is particularly dangerous, since the surface of the tool has cooled down and has lost its toughness. It can, therefore, be understood that tools crack particularly easily when cooled too rapidly.

As stresses increase with the dimensions, the walls of the hot working tool should be as thin as mechanical stresses permit. This consideration is confirmed by the observation that, for instance, in the manufacture of screws and rivets, solid, thick walled dies will not perform as well as thin walled inserts from the best hot working steel which can be shrunk into fittings of 114,000 lb. per sq. in. tensile strength.

Thermal Reversing Stresses

The surface of the hot working tools is exposed to continual changes in heating and cooling in the course of work, as shown schematically in Fig. 2. By the continuous temperature change, a fatigue stress is caused in the surface layer which produces a fine network of cracks after more or less extended use. These cracks penetrate only a little below the surface. But in the course of work they extend rapidly and can lead to loosening of surface material so that the tools are wrecked very quickly. The formation of this network of cracks is strongly influenced by the notch-action of surface lines. Since the fatigue strength is decreased by a simultaneous corrosion attack it may be assumed that fatigue stresses are enhanced by water cooling. Perhaps the surprisingly good performance of the 14 per cent chrome steel in water cooled punches, etc., has been due to the good corrosion resistance of this steel, a performance which cannot be explained by its other properties.

The thermal reversing stresses will increase with the amplitude of the heat waves, that is, with the difference between the maximum and minimum temperature at the tool surface. Temperature variations, of course, equalize themselves very rapidly as they progress toward the interior, so that the core of the tool is either not affected at all, or only to a limited extent, by the surface temperature variations. The depth of penetration is shown in Fig. 3 for a highly alloyed hot working steel and for various period frequencies. Since in many hot working tools, surface cracks begin to appear after a few hundred or thousand work periods, their fatigue strength must then have been exceeded.

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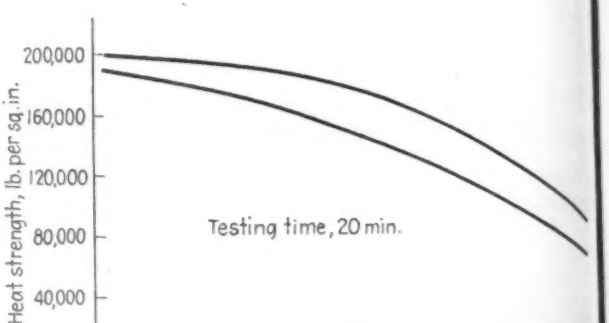
FIG. 6 — Influence of tempering resistance on heat strength of a 10 per cent tungsten steel. The upper curve is for a tool oil quenched from 2100 deg. F., tempered at 1110 deg. and cooled in air. The tool represented by the lower curve was oil quenched from 1740 deg., tempered at 930 deg. and air cooled.



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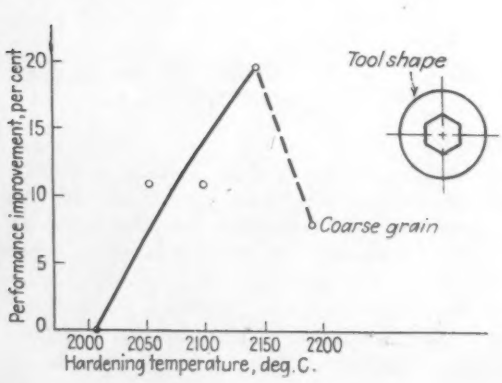

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FIG. 5—Influence of hardening temperature on performance of a hot pressing die to manufacture hexagonal ¾ in. nuts, made of 10 per cent tungsten steel. This die was treated for 50 to 52 Rockwell C.

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The unavoidable heating of tools in operation causes a tempering action, decreased heat strength and wear resistance. Hot working tools are hardened and tempered to a suitable hardness and toughness for each special purpose. They must not lose their hardness in service; even after extended use at the working temperature, they must have a sufficient tempering resistance. Prominent edges and corners are particularly exposed to the heat action, they lose their hardness easily and can then no longer resist the work pressure. Thus, for example, the blunted tip of a punch has a hardness of only 26 Rockwell C as compared with an original hardness of 36 Rockwell C.

If working conditions are not carefully watched the transformation

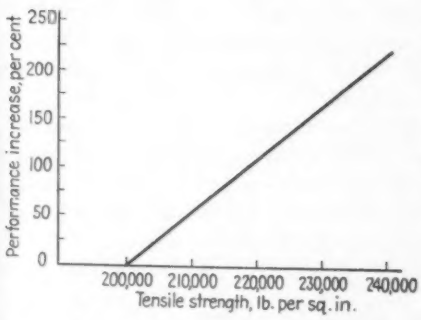

FIG. 7—Influence of strength on the performance of a conical valve die of 4.5 per cent tungsten steel.

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point can be exceeded, and hardening may take place in subsequent cooling.

In Fig. 4 the tempering curves of popular hot working steels is shown. Below 1240 deg. F., none of these steels reaches the tempering resistance of the 10 per cent tungsten steel. (*Editor's note: This steel apparently was standard in Germany for hot working tools until a recent order took effect.*) When less tempering resistant steels are used, excessive heating must be avoided. Above 1240 deg., practically all steels anneal and only austenitic materials can be used. Austenitic extrusion dies have stood up well to very high working temperatures.

Tempering resistance depends not only on the composition of the steel, but also on its heat treatment. According to more recent ideas, tempering resistance is due to the sluggish precipitation of the dissolved special carbides. The hardening temperature and time must be chosen in such manner that these carbides are as completely dissolved as possible without producing a coarse grain structure by excessive heating or timing. The influence of the hardening temperature upon the tempering resistance of the 10 per cent tungsten steel can be seen from Fig. 4. A comparison between curve 1 and curve 2 demonstrates the considerably greater tempering stability when hardening temperature is increased from 1830 deg. to 2100 deg. F. After tempering at 1110 deg., the hardness is 53 Rockwell C to 48 Rockwell C. Tools treated for a greater tempering stability attain better performances than tools which were quenched from too low a hardening temperature. Thus the performance of 10 per cent tungsten die steels used in the manufacture of hot pressed nuts improved by 20 per cent when the hardening temperature was increased from 2010 deg. F. to 2150 deg., as shown in Fig. 5. When the hardening temperature was increased to 2190 deg. F., the structure tended to become coarse-grained and the performance of the tool dropped off again.

Stress conditions in tools are usually so complicated that they cannot be calculated accurately. Therefore the forming and shaping of hot working tools, as well as the choice of steel, depends almost exclusively on empirical observations. For the calculation of tools which will be used only over short working periods, a high temperature tensile test will give a good indication, while the permissible load for parts which have to operate continuously at elevated temperatures must be calculated exclusively on the basis of creep strength. Useful comparative values are given by high temperature tensile tests of 15 to 20 min. minimum duration. Creep limit generally decreases with the temperature. Reliable data regarding the creep limit of hot working steels are not available in the literature. Strength at elevated temperatures is not only dependent on chemical composition, but is influenced by heat treatment, just as is tempering stability.

Fig. 6 shows the influence of tempering stability on strength at elevated temperatures. A 10 per cent tungsten steel was quenched (from 2100 deg. F.) so as to produce martensite; also, this steel was hardened at only 1740 deg. F. so that after tempering only a sorbitic structure was present. In general, it can be said that higher tempering stability is accomplished by higher strength at elevated temperatures.

The strength at elevated temperatures usually runs parallel to the room temperature strength. (See Table I.) Thus a 10 per cent tungsten steel offers considerably better strength at elevated temperatures when it is heat treated to pull 230,000 lb. per sq. in.

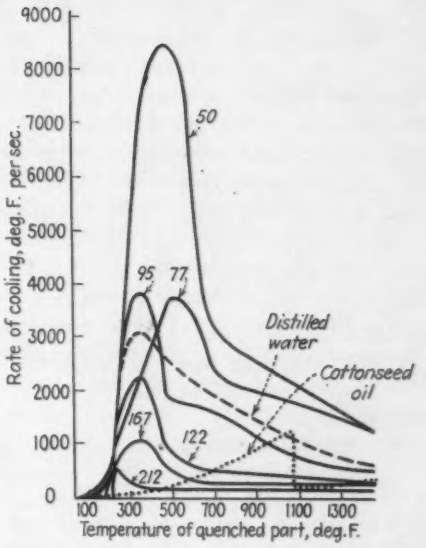

FIG. 8—Influence of temperature of cooling water on the cooling rate of the tool.

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than when it was treated for a tensile strength of only 190,000 lb. per sq. in. In practice it is found that the performance of most hot working tools improves with their tensile strength.

As shown in Fig. 7, the performance of dies in the manufacture of valves increases with the strength. Heat strength of a tube piercing mandrel, previously referred to, which necked in pressing of duralumin tubes, became adequate and necking was eliminated, just by increasing the strength from 206,000 to 256,000 lb. per sq. in.

High temperature resistance must also be aimed at to improve wear resistance at elevated temperatures. Although exact data are not available in the literature concerning the wear resistance of hot working steels, experience has shown that hardness at elevated temperatures, good work hardening properties and toughness are favorable. Hard adhering surface layers have proved their value while a soft skin is very detrimental and leads to scouring.

The tool maker might be inclined on the basis of these data to treat his tools for the greatest hardness in order to obtain high heat strength, tempering stability and wear hardness. However, very rapid elimination of his tools by cracks would likely be the consequence. The basic condition in the heat treatment of hot working steels requires that tempering should at least be carried on at the actual service temperature, which is however not known and can hardly be estimated. The tempering temperature must also be chosen in such a manner as to warrant sufficient toughness with regard to the effects

of the unavoidable temperature stresses. Also, tool strength and therefore the tempering temperature must be adapted to the shape of the tools. If notch effects, with their influence on impact resistance cannot be avoided, a correspondingly lower tensile strength must be chosen. The tempering temperature, therefore, while determined by the tensile strength and through it by the strength at elevated temperatures, is an empirical value which depends very largely on the kind and shape of the tool and on local working conditions.

Reduction of Heat Effect

In order to reduce to a minimum the effect of heat and of the thermal-reversing stresses upon the strength properties, and of the temperature gradient in the tools, as well as the difference between maximum and minimum temperature at the tool surface, the surface temperature must be kept at a minimum. The temperature of the tool surface is determined by the temperature of the work, by the degree of heat transmission, and by the heat conductivity of the tool. The surface temperature increases with the temperature of the work, with the contact of tool and work, and inversely with the heat conduction of the tool. The greatest temperature difference will be at the point of the greatest cross-section.

The working temperature is determined by mechanical and chemical constants and can be modified only very slightly. It should be kept as low as possible. If operations are carried out at temperatures higher than the possible minimum, tool costs will increase. Thus, the better wear of dies in die casting brass as compared with injection molding is obviously due to lower working temperatures.

Also, the heat conductivity cannot be changed at will. It decreases with increasing alloy content in the tool. Under certain circumstances, the advantage of better tempering stability and heat strength of a hot working steel are cancelled by its decreased heat conductivity and the higher surface heating occasioned by it. Thick punches of 10 per cent tungsten steel tend to form hardening cracks when they are water cooled owing to the bad heat conductivity of the steel. Under these conditions, less highly alloyed steels with a better heat conductivity such as the 4.5 per cent tungsten steel have been more successful.

The coefficient of heat transmission offers a chance to modify the service temperature. The transmission of heat can be reduced by giving tools a firmly adhering insulating nonmetallic cover. In recent tests at the Kaiser-Wilhelm Institute it was found that the heat transmission to drop forging dies can be reduced by about a third when a ferroso-ferric oxide (Fe_3O_4) surface layer is imparted to the tools. In hot punching it can be observed that a clean die absorbs considerably more heat than a die protected by an oxide skin surface cover.

These oxide layers can, as already stated, be applied by burnishing in special salt baths or by burning with oil, or by special tempering. In the manufacture of seamless tubes it is recommended that the piercing punch be provided with a special iron chloride surface layer by salt treatment. To prevent contact of the tool with hot work and to make the heat transmission as poor as possible, anthracite coal is used in punching and sawdust in drop forging. The application of graphite paste to the die is also frequent in punching.

In future, the possibility of modifying the heat transmission coefficient by surface layers of gas producing substances, or by lubrication will be increasingly made use of.

The lowest surface temperature of the tool depends mainly on the degree of cooling. The tool should always be cooled in such a manner that only the heat quantity which was added during the work cycle is removed, in order to avoid a build-up of heat. After cooling the surface temperature should still remain at 390 deg. F. or more. Frequently, however, the tools can be touched after cooling. Such an extreme however, means an unnecessary stress which must lead to a premature tearing of the tool. In all operation delays and lengthy work intervals, no cooling should be performed. If the tools have been cooled down too much they should be warmed. In a number of tools, for example, in pressing dies, additional heating during operation for the reduction of stresses has proved most efficient. In order to reduce unnecessary stresses, also, the rate of cooling should not be too abrupt.

A number of investigations have shown that the effectiveness of water as a coolant depends to a high degree on the water temperature, the motion of the cooling water, and on the temperature of the tool. Fig. 8 shows that by heating the water the cooling effect can be varied within wide limits. At a temperature of about 122 deg. F., the efficiency of cottonseed oil is attained. In practice, however, the temperature is only rarely considered. Its determining influence upon tool performance is not known. In a foreign plant, in punching operations, it was observed that the die consumption was much higher in winter than in summer. An investigation showed that the temperature of the cooling water was about 36 deg. F., in winter; in summer, however, it was 70 deg. F. By the use of cooling water heated to about 120 deg. F., greatly improved performance was obtained. Cooling should not follow the work cycle immediately, but it should wait for a certain temperature stabilization corresponding to say curve B or C (Fig. 1). In premature cooling a hardening may take place if in service the surface of the tool should reach the transformation point. Owing to the great difference in the structure, stresses will cause a rapid destruction of the tools by the formation of numerous cracks. [*Translated by C.M.C.*]

TABLE I

Effect of Original Tensile Strength on Strength at Elevated Temperatures in a 10 Per Cent Tungsten Steel

Original Tensile Strength at Room Temperature, Lb. Per Sq. In.	Service Temperature, Deg. F.	Yield Limit, Lb. Per Sq. In.	Tensile Strength, Lb. Per Sq. In.	Elongation Dia. : ½ Length, Per Cent	Reduction in Area, Per Cent
230,000 (2100 deg. F. oil quenched, 1220 deg. temper for 2 hr.)	750	134,000	177,000	8	27
190,000 (2100 deg. F. oil quenched, 1255 deg. temper for 2 hr.)	750	120,000	150,000	9	28

Physical Characteristics Of

Gold-Indium Alloys

BECAUSE of its high cost, gold is seldom considered an industrial material. However, like the industrial diamond, it is sometimes economical in spite of its high unit cost. Its use with indium in solder frequently results in considerable net savings.

Indium alloys readily with gold. Although the melting point of indium is but 311 deg. F., it has a boiling point of 2642 deg., so there is no appreciable loss in melting. Indium is not easily oxidized, but prolonged exposure of the molten metal to air will result in some oxide formation.

As shown by the constitutional diagram (Fig. 1), indium additions to gold cause a rapid decrease in melting point, making possible the production of low melting alloys of high gold content. The solubility of indium in gold is:

Per Cent		Deg. F.
8.5	at	1197
4.8	at	1004
4.0	at	770
2.0	at	68

The alpha phase, in stable condition, has an elementary cube of 4.100 A°. The beta phase is close packed hexagonal structure with a homogeneous phase from 9.8 per cent to 12.8 per cent indium. Heterogeneous structure has been observed at 14 per cent indium. The lattice spacings at 12.8 per cent indium are:

$$a = 2.908 \pm 0.0032 \text{ A}^\circ$$
$$b = 4.777 \pm 0.004 \text{ A}^\circ$$
$$c/a = 1.643$$

At lower indium content, "a" increases and "c" decreases. The gamma phase forms for the melting of beta at 910 deg. F., and has the formula Au_3In (16.8 per cent In). The delta phase forms along the 921 deg. peritectic with limits of 19.8 per cent to 20.3 per cent indium and has the formula Au_7In_3 (20.0 per cent In).

AuIn occurs between 20.0 per cent and 36.9 per cent indium and forms a eutectic with the delta phase at 844 deg. (26.7 per cent In). $AuIn_2$ occurs at 1005 deg. (53.8 per cent In). It has an elementary cube at 6.505 ± 0.003 A° and forms a eutectic with AuIn at 921 deg. (41 per cent In). Alloys in the alpha phase are workable. The following heterogeneous phase is more brittle but still workable, while AuIn and $AuIn_2$ are not workable. The hardness increase with indium additions as shown by the following values:

Au Per Cent	In Per Cent	Hardness (Rockwell B)
96	4	42
92	8	58
87.5	12.5	80

These alloys are precipitation hardenable. For example, the hardness of the 92 Au-8 In alloy increases from 58 to 69 after two hours at 570 deg. Cold working gives a still higher value. Although the alloys containing more than 12.5 per cent indium are not workable, they cast and polish well.

It has been found very practical to produce a very corrosion-resistant coating of the harder alloys by successive plating of gold and indium and then alloying by diffusion at about 330 deg. The continuity of this type of coating and the fact that it is less permeable than gold, as well as being very hard, are worthy of emphasis.

Indium-gold has some unique characteristics for brazing. The alloy of 77.5 per cent Au and 22.5 per cent In has a working temperature of little above 930 deg. When used on metal objects with glass inserts this is an ideal temperature, since any temperature above 1110 deg. is destructive to glass-metal seals; and on the other hand, working temperatures of 750 deg. must be endured. Furthermore, the low vapor pressure of indium prevents unwanted contamination of adjacent parts such as occurs when zinc is used in the brazing material. This alloy may be used as a powder or as a sheet which is made by plating gold foil with indium and then diffusing. Alloys of lower indium content may be rolled into sheet instead of following the above procedure.

It will be observed that the indium-gold plate, as diffused, is of approximately the same distribution as the 40 per cent indium—60 per cent gold alloy. This alloy is very hard, in fact too hard and brittle for ball impression hardness tests. However, as a diffused coating, the crystals are small and it is very hard and resistant to wear without being brittle. The spectral distribution of several other alloys has been measured and the intermediate percentages give curves falling between those shown.

Increasing the indium content of alloys lightens the color of gold, which passes through a white to a definite blue. The colors are pleasing as decorative finishes and at the same time provide maximum protection.

Indium is also of value in the ternary and more complex alloys containing gold. A green gold with indium is much more tarnish-resistant than the more commonly known green gold. From 5 to 8 per cent indium produces fairly hard, workable alloys. A representative alloy is:

	Per Cent
Au	75
Ag	20
In	5

This alloy has a hardness of 70 Rockwell B. The tarnish-resistance is superior to that of green gold as usually produced.

Indium-gold alloys deserve consideration whenever a hard, corrosion resistant alloy is needed, as they can easily be applied as a coating or worked in mass, without putting further demands on critical metals.

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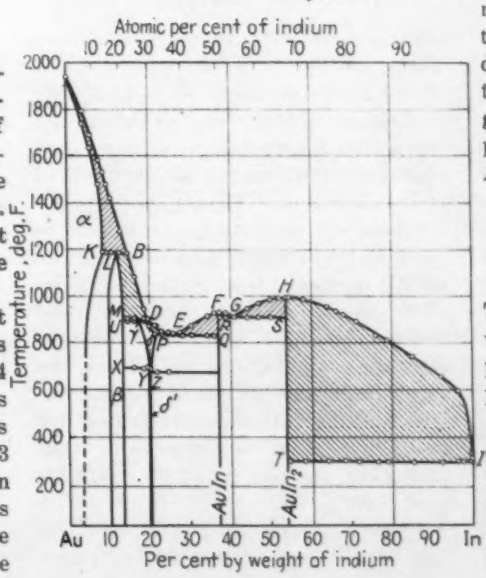
FIG. 1—Phase Diagram of the Gold-Indium System



Control of Residual Stresses

By MONTGOMERY Q. CELLERS
Welding Superintendent, Seattle-Tacoma Shipbuilding Corp., Seattle, Wash.

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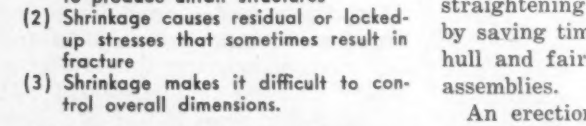
AN erection and welding sequence is a plan relating to successive operations of erection and welding required in the fabrication of welded steel structures in order to control shrinkage, because unless properly controlled,

(1) Shrinkage as a result of welding tends to produce unfair structures
(2) Shrinkage causes residual or locked-up stresses that sometimes result in fracture
(3) Shrinkage makes it difficult to control overall dimensions.

While welding is the principal cause of these faults, it is not altogether responsible for all of them. Among other causes are:

(1) Rolling and galvanizing stresses
(2) Storage and handling distortions
(3) Gas cutting shrinkage
(4) Improper fitting, i.e., loose or forced fitting
(5) Unequal expansion from sun's rays
(6) Unequal expansion because of changes in atmospheric temperatures



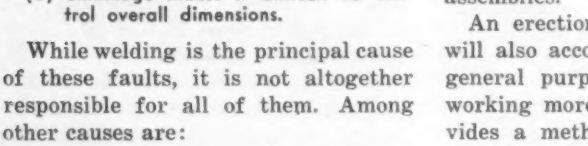


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FIG. 1 — Shrinkage of weld metal on one side of an angle bar results in this type of distortion.

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(7) Overshrinking (Overshrinking will sometimes destroy all that sequence may have accomplished).

There is a tendency in most shipyards to spend time and money in straightening by shrinking and pressing rather than to adopt methods to keep structures straight while erecting and welding. This is a mistake because it takes quite a large crew to do the straightening, and it consumes large quantities of gas and oxygen which in these times are essential materials. The use of water for quenching is somewhat of a nuisance, especially on the hulls.

The belief that strict adherence to an erection and welding sequence may slow up fabrication is unfounded. Experience has proved that it ultimately speeds up production by eliminating most of the time and cost of straightening distorted members, and by saving time necessary to fit to the hull and fair-up "unfair" or warped assemblies.

An erection and welding sequence will also accomplish much beyond its general purpose. Where a yard is working more than one shift, it provides a method and order of procedure for each shift. If there are a dozen different ways of doing a job, and each shift tries to do it a different way, very little will be accomplished; while if each shift uses the same method and order of procedure, the job will be completed in an orderly manner with a minimum of manhours. The objection to a sequence because of the fact that ships' hulls and their various parts cannot be fabricated and erected by a sequence governing every operation down to the smallest detail is no objection. This is because an erection and welding sequence can be more or less general and need go into detail in very few instances. The more knowledge the shipfitters and welders have of just what welding shrinkage is and how it affects the ship's hull and its many sub-assemblies and the various methods that are used to control or counteract that shrinkage, the less detail the sequence need have.

There has been much discussion pro and con regarding welding under restraint versus so-called stress-free welding. I prefer the stress-free method because by its use we can eliminate much stress which, if not eliminated, may prove disastrous. The hulls produced through welding entirely under restraint have considerable locked-up or opposing stresses in them which may result in fracture if too much of this stress is in a part of the hull that receives considerable stress in use. A restrained weld will relieve itself of some contraction while in a plastic state, but there is considerable contraction that must take place after the weld metal cools beyond the plastic stage.

There are objections to using some of the present type of automatic welding on shell and main decks in other than sub-assembly. While the high heat, speed of welding and the large amount of flux covering the weld results in an annealed weld, the objection is that the detrimental contraction is parallel to the weld and consequently automatic welding is not as flexible as manual welding nor as easy to apply to stress-free welding. If automatic welding is done under restraint, there is considerably more locked-up stress than if manual welding were used under the same conditions.

While the only stress-free welded structure is a properly annealed one, a structure produced by stress-free welding should have little more locked-up stress than a riveted one and has considerably more strength than a riveted structure because of the higher strength of welded joints. Riveting sets up stress because of the expansion of the metal around the rivet holes.

It might be well here to briefly discuss the things that go to make up an erection and welding sequence. They are:

(1) Welding technique
(2) Welding procedure
(3) Order of welding
(4) Manner of erection
(5) Order of erection.

Welding technique and procedure are as much a part of erection and welding sequence as are manner and

Through Welding Sequence

order of erection and welding. While it is possible to accomplish some results without them, far greater results can be accomplished with their help.

Welding technique pertains to such things as welding heat (amperage and voltage control), angle of electrode to the work, arc length, speed of travel and oscillation. Procedure relates to size of pass, number of passes, and the order of making them, back step or wandering procedure, direction of welding, etc.

As most experienced welders have some knowledge of welding technique and procedure control, no attempt will be made to go into them in detail.

Those familiar with some of the problems encountered in fabricating all-welded steel structures are possibly not aware that the methods and order of erection are just as important as the methods and order of welding. Both are necessary to accomplish the desired results.

. . . Minimizing of residual stresses resulting from expansion and contraction during welding is the most serious problem encountered in this method of fabrication. The practical suggestions for obtaining stress-free joints set forth in this article have been extracted from a privately published treatise by the author on "Erection and Welding Sequence as Applied to Welded Steel Vessels." The principles apply equally well to all types of large welded assemblies.

Expansion and Contraction

Metal expands under heat and contracts as it cools. If the expansion is restrained, the heated metal will upset to some extent (depending upon the amount of heat and to what extent the member is restrained) which results in more shrinkage than would be the case if expansion were not restrained. Now if contraction were also restrained, we would have what we call residual, or locked-up stress. The explanation of the accompanying illustrations will prove the above statements.

Fig. 1 is an angle bar before and after one pass is welded along one flange. The result is considerable warpage.

Fig. 2 shows two 15-lb. plates beveled 30 deg. with a ⅛ in. root opening. After tacking and before welding witness marks are placed by making punch marks on either side of the weld 10 in. apart. After welding and cooling, a shrinkage of approximately 0.055 in. is found. The metal when deposited in the V was in the fluid state, therefore it was expanded to the limit, and as it contracted it drew the plates toward one another.

In order to get a better understanding of what is meant by residual stress, the results produced by disregarding erection and welding sequence will be demonstrated as well as what can be accomplished through the proper use of it. By disregarding it, locked-up stress and warping occur. Through the application of it, these faults are overcome.

In Fig. 3 two plate members were

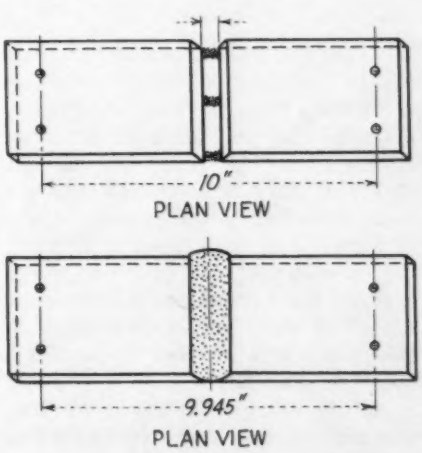


FIG. 2—Measurement of distance between witness marks on steel plates shows shrinkage that takes place in a butt weld.

welded while both were entirely restrained. The result was that the butt weld fractured because of the contraction of the weld metal. Each plate was welded to the strongback and then one light pass was run down the joint before welding the two bars on either side of the joint; consequently the butt weld was not strong enough to withstand the strain of contraction. Had it withstood the strain, there would have been considerable locked-up stress in the members between the strongbacks to which they were welded.

If, on the other hand, one plate is welded to one end of the strongback, making it immovable, while the other plate is clamped and wedged to the opposite end of the strongback, allowing it some freedom of movement, Fig. 4, a light butt weld between the two plates will not break because one plate was not totally prevented from contracting toward the point of welding. After removing the wedges we find the plate is straight. This is the result of restraint afforded by clamping. The free plate can now be welded to the strongback and the job is complete with a minimum of locked-up stress.

We now have Rule 1: Leave one end of a member or structure free to contract toward the point of welding. We learn here too the importance of method of erection. Had both bars been tacked or welded instead of being clamped, either tacks or weld would have been broken, or there would have been residual stress in the member because of the stiffness of the strongback.

Fig. 5 shows a disk with a pad welded to it near the center. If this job were welded without being clamped down, the result would be considerable warpage. Fig. 6 shows how this job can be clamped and welded without warpage.

We now have Rule 2: Warpage may be prevented by clamps or by weighing the members down.

Fig. 7 represents a pipe which is to be welded in a collar which, in turn, is to be welded to a bulkhead. If the

collar were arc welded to the bulkhead, then the collar to the pipe, there would be considerable locked-up stress in the welds, although not great enough to break the weld. Several years ago when an attempt was made to weld, with oxy-acetylene, a pipe and collar to a large rectangular tank in the above order, all the stress possible was locked up in the plating and the weld of the pipe to the collar fractured. If the collar is clamped to the bulkhead while the pipe is being welded to it as shown in Fig. 7, and allowed to cool and consequently contract, and then the collar welded to bulkhead, there would be locked-up stress in only one weld.

Fig. 8 represents a subassemblied section of a main deck. By way of illustration let us erect and weld this subassembly so as to lock up all the longitudinal stress possible. We are not greatly concerned about transverse stress because the hull of a ship rarely, if ever, receives as much transverse as longitudinal stress. If it becomes a choice of transverse or longitudinal stress, the object is to eliminate the longitudinal stress. Longitudinal stress is obtained from transverse welds and transverse stress from longitudinal welds when welding is done manually.

The longitudinal seams are erected and tacked first and the transverse seams second. If the welding is done without regard to procedure, after the welding is finished and the plating cooled to atmospheric temperature, there is tension in the transverse welds and compression across the plating opposite the transverse welds. It is obvious that such disregard of procedure control greatly impairs the longitudinal strength of this subassembly. If this section were then erected on the hull and tacked securely in place (including deck to shell junctures) and other sections erected on either end and secured in the same manner, then the transverse bulkheads and the butts between sections welded, there would be so much locked-up stress that the completed ship would lack the longitudinal strength necessary to enable the vessel to withstand the stresses encountered in service.

Controlling Residual Stress

An erection and welding sequence starts in the mold loft. Because welding causes shrinkage, provision must be made for extra material to compensate for this shrinkage. This is done by expanding the templates, which means the templates are made larger than the finished structure or assembly is intended to be. Some yards use two sets of templates, an expanded template for use before welding, and a normal template for use after welding. In addition to the extra material gained through the use of an expanded template, excess material must be left wherever necessary to have enough for trimming to size after welding and to provide for enough extra length for fitting on the ship where definite dimensions cannot always be maintained.

The amount of expansion necessary is determined by using a shrinkage chart compiled by checking shrinkage on numerous structures welded with all types and sizes of welds. It would not be practical to apply this chart in figuring the shrinkage expected in every member and assembly which go to make up the hull. Instead, the length of the hull is divided into sections according to the general weight of material and the amount of welding in each section. It is not necessary for the welders and shipfitters to know how much shrinkage is going to take place in a member or assembly, but they must know that it is going to shrink and provide for controlling that shrinkage so that locked-up stress in the finished job is not excessive and the structure or assembly is fair.

Among the many things that govern the amount of weld shrinkage are:

(1) Amount of heat the welder uses for a given size weld and a given size rod
(3) Root opening
(4) Weld size
(5) Welding procedure

One of the most important things which affect the fairness of a finished welded structure or assembly is weld size. Oversize welds tend to shrink a member more than welds of normal size. Shrinkage is in proportion to the excessive weld metal. In addition to the problem of having to contend with excessive contraction from oversize welds, more time and material is consumed in making them. Secondly, the slower the actual operation of consuming a welding rod into the weld, the more the contraction. Also, the wider the root opening the more shrinkage. The use of "hot" rods gives less warpage because the high speed of welding with this type of electrode imparts less detrimental heat into the parent metal than do the slower electrodes. If it were possible to make a complete welded joint instantaneously there would be very little distortion or locked-up stress in the joint, provided contraction was in no way restrained.

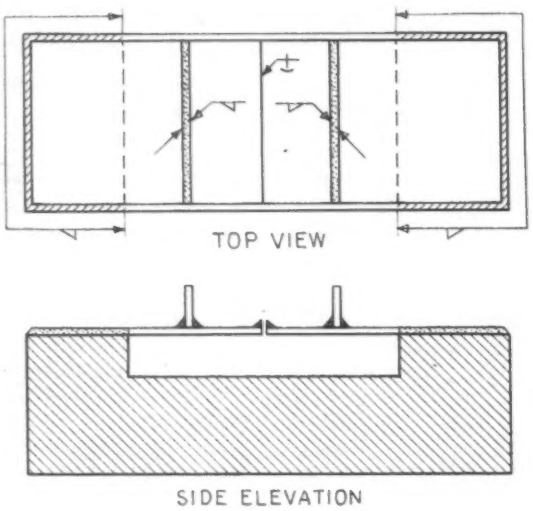


FIG. 3 — Where both plate members are restrained, a light butt weld will fracture due to shrinkage stress.

The major shrinkage of a manual weld is at right angles to the weld. The shrinkage along the line of weld is so slight that in most cases it can be ignored.

Some of the ways in which welding shrinkage is controlled or counteracted are:

(1) Care in fitting
(2) Use of the wandering procedure
(3) Backstep procedure
(4) Partial restraint while welding
(5) Keeping the welding evenly balanced both vertically and horizontally
(6) Peening
(7) Preheating
(8) Post heat treatment (annealing)
(9) Erection by subassembly.

Care in Fitting

1. If the fitting is sloppy, i.e., if the root opening of edge to edge butts is not uniform but varies in width throughout its length, if lap joints are not fitted metal to metal, if force is necessary to secure a proper fit or if the proper order of fitting in rela-

tion to the order of welding is not maintained, then the purpose of a welding sequence is defeated before welding is started.

Use of Wandering Procedure

2. The wandering procedure is the running of short increments at random throughout the structure. This spreads the heat over the entire unit or assembly and keeps the heat lower generally throughout the structure. Before the second series of increments are started the first will have cooled. The heated metal upsets when heated by the arc and is stretched while cooling (within the plastic stage) because of the stiffness of the surrounding metal. This method cuts shrinkage considerably.

Backstep Procedure

3. Backstep means welding short increments in the opposite direction to which welding is progressing and fusing each increment into the start of the preceding one. This method distributes a nearly equal amount of stress in each increment.

Partial Restraint While Welding

4. Many sorts of jigs, clamps and other restraining devices are used to hold members to shape while welding. Strongbacks are used to a great extent, especially on shell and other plating butts. These restraining devices must not prevent shrinkage toward the point of welding, but should act as a guide only for the member while it is shrinking. Generally, in restraining members to hold them straight while welding, it is necessary to lock up some stress. This is permissible if the locked-up stress is not great enough to cause fracture or is not where a great amount of extra stress will be placed on the members having such locked-up stress.

Sometimes tacking is used to restrain shrinkage but is not as satisfactory as jigs or clamps because shrinkage generally breaks the tacks and they have to be removed before welding is continued. This generally entails the use of clamps to bring the assembly down to the slab again before it can be retacked.

Strongbacks or temporary stiffening is generally used on butt welds but may also be used on and around the edges of bulkhead, deck, or other plating assemblies. Strongbacks should be clamped in place rather than be tacked so as to allow shrinkage toward the point of welding. In some instances such as when strongbacks are used on butt welds, they may be tacked on one side of the weld and clamped on the other. One common mistake often made in using strongbacks on butt welds is in making them too short to be effective. Plating butts which are welded before other structural members are added should have strongbacks at least 3 ft. long. Deck and shell butt strongbacks on the ship should be at least as long as three frame spaces. On straight plating butts, strongbacks should be placed across the weld. When butt welds form a knuckle at the weld and restraint of shrinkage inward is not necessary, parallel strongbacks may be used. Butts in shaped or rolled plating should have shaped strongbacks on the inside of the bend.

Sometimes it is necessary to backset or warp a member in the opposite direction to which it will shrink when welded. An example of this is when welding rider bars to plate webs which must be true because of other members attaching to them or when they may be used for machinery bases.

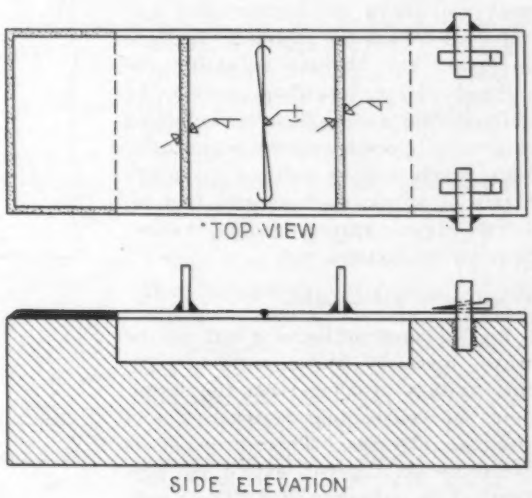


FIG. 4—Clamping and wedging one plate to the strongback permits normal shrinkage to take place in the weld, yet prevents warping of the members due to welding heat.

Keeping the Welding Evenly Balanced

5. Welding should be kept evenly balanced when welding long subassemblies. This is not altogether true of those having a more bulky shape. When welding junctures of framing, welding should progress evenly in regard to all welds of each juncture and should be distributed evenly from top to bottom. The distribution of heat is not so important on junctures of deep framing with respect to holding the shape of the assembly.

Long members or long subassemblies can only be kept straight by having the welding progress evenly from side to side and top to bottom, and in some cases, side or up or down movement must be restrained. This is the case where more welding is required on one side than there is on the opposite side. Identical members may be clamped back to back. Here again, if the amount of welding required is not even, side to side or top to bottom, some additional methods may have to be used. This may be done by warping or springing the member in the opposite way to which it is expected to warp. In welding long subassemblies, the wandering sequence may be used or welding may start in the center and progress toward either end, or may start at one end and progress toward the other end, depending upon whether it is desired to shrink the assembly as a whole or to shrink each part of it as welding progresses.

Peening

6. Peening as a method of stress relieving is sometimes resorted to when it cannot be accomplished by ordinary means. This is especially true in welding heavier materials where all the weld shrinkage is locked-up. The amount of peening necessary is often a matter of conjecture. If the member is heavy enough to stand heavy peening and large diameter rod with plenty of heat is being used, then the weld may be peened until the metal on the surface is flaked. Sometimes light peening is all that is necessary. In only rare cases are the first and last pass of multiple pass welds peened.

Preheating

7. Partial or complete preheating is sometimes used when welding subassemblies or parts of subassemblies are made up of heavier shapes or plates. Partial preheating may be done with gas, oil torches or other means, and

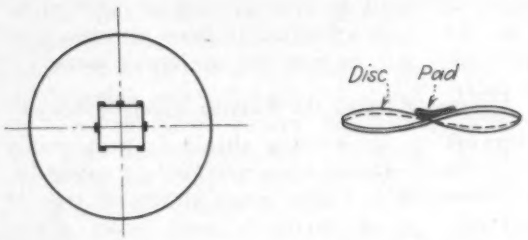


FIG. 5—Warpage produced in a disk by welding a pad to the center of it.

complete heating with furnaces or "hot house." The principle of preheating lies in bringing the temperature of the parent metal nearer that of the weld metal. The degree of effectiveness depends on the amount of heat used. If the temperature of the member or assembly is near 1200 deg. F. (at which heat the metal is plastic) while welding is in progress and the finished job allowed to cool slowly, there will be no stress in the finished job. Such a desirable condition is only possible in oxy-acetylene welding, so in order to produce a stress-free arc welded member or assembly, we must stress relieve it through annealing.

Post Heat Treatment (annealing)

8. Annealing is a quick process of aging. Through its use we accomplish in a few hours what would take years to accomplish through aging at atmospheric temperature. It should take considerably less time than that to relieve a welded steel hull of stress because the hull "works" while under way in a sea and also from the expansion and contraction of the decks and upper shell from the changes in atmospheric temperature.

Partial annealing may be used if the shape and size of the member permits. Complete annealing is accomplished through the use of a furnace with controlled heat. If the job is heated too fast, the lighter members will absorb the heat before the heavier members, thereby setting up additional stress that might result in distortion or fracture. Therefore, the heat is raised slowly to about 1175 or 1200 deg. F. and held there for several hours. At that temperature the metal is plastic and any stresses set up by expansion or contraction from the welding heat will be relieved. After the desired soaking time has expired, the heat must be lowered and the job allowed to cool slowly to atmospheric temperature because the heat will leave the lighter members before it leaves the heavier, resulting in strain and thereby defeating the purpose of the annealing process. In shipbuilding, complete stress relieving is generally used only on those members which will be subject to severe strain or shock, such as gun foundations, engine bases, rudders, rubber bearing weldments, etc.

Erection by Subassembly

9. The construction of a hull on the ways, piece by piece, would constitute quite a problem from the standpoint of controlling contraction and residual stresses. This problem is overcome to a great extent by prefabricating subassemblies. These subassemblies are also made up of prefabricated parts which contract when welded and consequently this contraction does not affect the subassembly. The same holds true with relation to the subassembly and the hull. Subassemblies may include rudder bearing weldments, flat and vertical keels, skeg and keel assemblies, shell sections, superstructures, bow and stern, and foundations such as gun, reduction gear, turbine and many small units. If design permits, sections of the ship from flat keel to main deck may be included.

Perhaps the most important consideration in subassembling is a sturdy foundation upon which to erect the structure. It should be strong and solid enough to hold the subassembly firmly in place and not get out of shape through constant use. Subassemblies may be erected in any position, resting them preferably on the flat surface having the largest area or on the surface which provides the most solid foundation. In fitting and welding these subassemblies, the main thing to bear in mind is that they should be tacked and/or clamped together and to their cradles in such a manner as to provide as little restraint as possible to contraction.

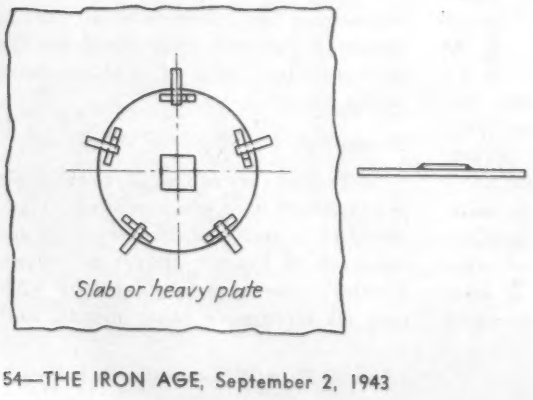


FIG. 6—Method of clamping disk to prevent warpage taking place as a result of welding a pad to the center.

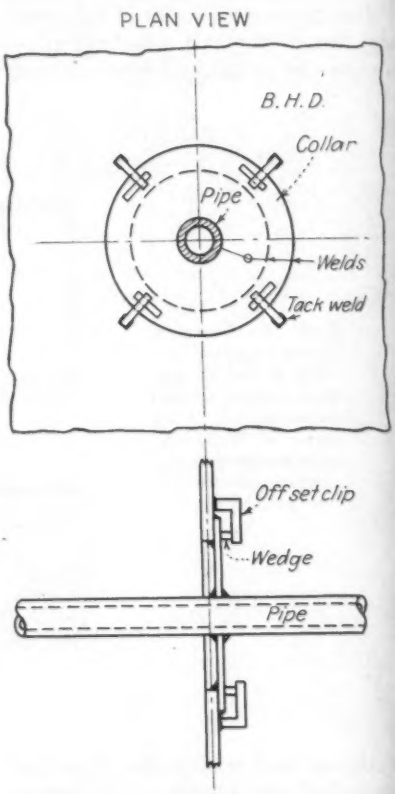


FIG. 7—Method of welding a pipe to a collar and the latter to a bulkhead to keep residual stresses to a minimum.

The best type of slab for subassembling is one of plating or cast iron slotted for use of pin dogs. These slots may be as close as their width apart. Care must be taken when using this sort of assembly slab that the dogs are not jarred loose in the handling of material, hammering, or contraction of the assembly upon which welding is being done. This type of slab is more suitable too when weights are used to prevent buckling of plating while welding. Open beam platforms are satisfactory when welding heavy material on which weight boxes or edge restraining is not necessary. The beams should be placed fairly close together. Another advantage a heavy slab has over open beam platforms is that the slab absorbs

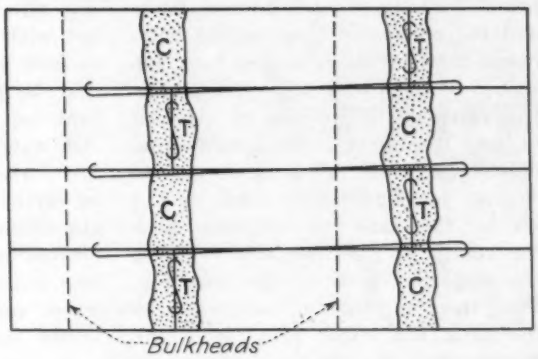


FIG. 8—If a main deck section is welded without regard to proper welding sequence, there will be compression across the plating opposite the transverse welds and tension stresses in the transverse welds themselves.

considerable heat and therefore helps prevent shrinkage.

Cradles or special jigs are practical when fabricating assemblies having other than flat surfaces and where much duplication is necessary. It is not an easy matter to design such jigs or cradles so as to use weights effectively on assemblies having other than flat surfaces; however, buckling is less noticeable in curved surfaces than it is in flat ones.

The use of these and other methods not mentioned can vary from yard to yard in their application to various types of steel construction. The important thing is application of the correct method to follow in working out a sequence for each type of construction, using the most suitable procedure for the job. A few examples will be given.

Sequence on Bulkheads

The similar designs of bulkheads offer a fairly easy problem in fabrication and welding sequence. With a bulkhead whose plating is under 10 lb. and whose stiffening runs in one direction and is all on one side, it is necessary to erect the bulkhead on a slab or platform so as to be able to weight down the plating to prevent buckling while welding, and to maintain a flat surface generally of the entire bulkhead plating.

Erection is started by fitting and welding all plate butts. In fitting and tacking these butts, which should first be cut to fair lines, it is necessary to maintain a root opening of approximately ⅛ in. so as to get proper penetration. Spacers of the desired thickness may be placed between the plates and sufficient tacking done to keep the seam fair until the first pass is completed. Weights which straddle the seam and bear within about 3 or 4 in. of either side of the seam are preferable and are used to prevent the welding heat from distorting the plates. The first pass is placed by running increments of 6 to 12 in. in length spaced about 18 to 30-in. centers; the next series of increments may be run between or behind the first series, etc., until the first pass is completed. After all welding on this side is completed, the plate is turned over and the opposite side of the seam is chipped out to sound metal and the welding completed in a manner similar to that used on the first side. The long seams are then fitted and welded in a similar manner.

After welding of the plating is completed, it is laid out with an expanded template and the stiffeners tacked in place. Weight boxes similar to those used on the plating seams are used while welding the stiffeners to the plating, and the edges of the plating are clamped to the slab in such a manner as not to restrain contraction. Welding is carried out using the wandering sequence, welding one or more stiffeners at a time, distributing the heat the entire length of each stiffener and staggering the increments from side to side.

In welding stiffening to a bulkhead where stiffeners are vertical and horizontal, welding must be started in the approximate center and advanced toward the outside in all directions. The junctures of the stiffeners must be welded in advance of the stiffeners to the plating because of the unequal contraction of stiffeners and plating. The rigidity of the plating will restrain contraction of the stiffener joints and leave tension in them which will force more contraction in the plating when the stiffeners are welded to it, thus resulting in nearly equal contraction of both.

Bulkheads having stiffening on both sides may require a special cradle or blocking for fitting and welding the stiffeners on the second side. Contraction of the bulkhead from welding these additional stiffeners must be provided for by expanding the template that is to be used for trimming.

If the weight of the plating in the bulkhead is over 10 lb., it may not be necessary to use weight boxes while welding

Sequence on Tank Top

Fig. 9 represents a tank top or platform having three longitudinal bulkheads and six floors under the platform, of which all members are 7-lb. plate. In order to have the proper dimensions in the completed assembly, oversize or "expanded" templates will have to be made and excess material left in the proper places. The tank top plating does not need to be expanded to compensate for shrinkage of the butt welds but may have excess material on one side and one end. Frame lines must be laid out with expanded templates because when the centerline bulkhead and floors are welded to the tank top, it will shrink approximately 0.055 in. for each T-weld. The centerline bulkhead will shrink approximately double that amount because it has two T-welds per frame space and must be expanded accordingly. The floors will contract slightly toward the tank top and the center line bulkhead, so excess material on the bottom and outboard edges is necessary.

Erection and welding of this assembly must start with fitting of the transverse butts of the tank top, completing both of them before the long seam is fitted or tacked. If the long seam is welded before the transverse

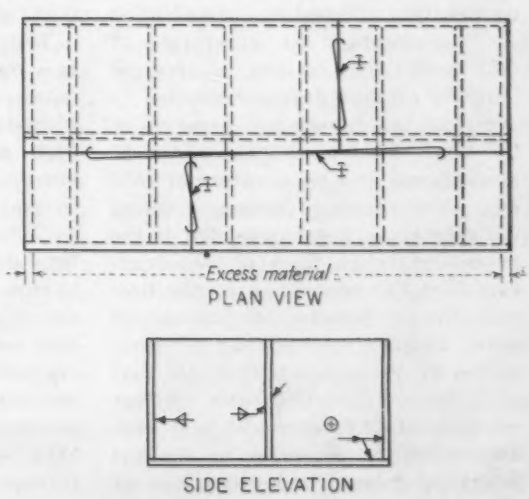


FIG. 9—Subassembly of a double bottom or platform floors.

seams, there will be longitudinal shrinkage at the transverse seams and none in the plating directly across the long seam. This will result in considerable buckling of the plates opposite the transverse weld. It is necessary to use weight boxes which straddle the seam while welding is in progress in order to hold a minimum buckling of the plates. The assembly from this point on can be most conveniently done in an upside down position.

In erecting the floors and longitudinal bulkheads to the tank top, the floors must be tacked to the longitudinal bulkheads and both clamped to the tank top because the longitudinal bulkheads are going to contract longitudinally more than the tank top, and the floors and longitudinal bulkheads outboard are going to shrink toward the centerline bulkhead. Tacking of each pair of floors and the section of longitudinal bulkheads between floors to the tank top should be done only when reached in the sequence of welding. It is best to weld the floors to the longitudinal bulkheads first, allowing them to shrink longitudinally, then weld all to the tank by starting near the center of the assembly, welding two opposite floors to the tank top, then the longitudinal bulkheads to the tank top either way from the welded floor to the next unwelded floor, etc., until the welding is completed. While welding is in progress, the tank top may be clamped to the slab by clips or dogs placed around the edges. Weight boxes on the plating between the floors will prevent buckling of the tank top.

After welding is completed, the bottom and outboard edges of the floors and all sides of the tank top are laid out with a normal template and cut to size except that excess material may be left on one or both ends of tank top and longitudinal bulkheads. All water lines and butt lines and any necessary reference lines must be scribed in for the convenience of the shipfitters when this assembly is erected on the hull. In order to maintain a hull of fair lines, these butt, water and frame lines must be maintained throughout its construction.

[In the full paper, Mr. Cellers goes into considerable detail on the erection and welding sequence on other ship subassemblies and particularly on the hull. Because much of the discussion requires for its understanding a familiarity with ship construction and the technical vocabulary concerned therewith, it has been omitted from the abstract. Those interested are referred to the original paper, which may be obtained from the author.]

New Swedish Sponge Iron Process

REDUCTION of iron ores with carbon creates an equilibrium between CO_2 and CO, dependent on the temperature in the gas phase. In other words, only part of the C is consumed in reduction, while of the rest remaining as CO only half of the reducing power of the C is utilized. If the CO_2 formed could be removed from the reaction gases during the actual reduction process, further CO_2 would be formed as the equilibrium between CO and CO_2 tends to become reconstituted. In this way the whole of the C could be converted to CO_2, *i.e.*, the reducing ability of the C utilized.

These considerations have led E. Edwin to suggest a new process for the production of sponge iron, which is described in *Tid. Kjemi Bergves. Metall.* He suggests the addition of burnt lime to the reaction mixture to take up the CO_2 formed on reduction of the ore, the working temperature being around 1650 deg. F. But at this temperature, limestone dissociation would counteract the absorption of CO_2 by the lime, so that a pressure must be applied during reduction to overcome the dissociation pressure of the lime. This pressure is about 25 atmospheres at a temperature of 1650 deg. Application of pressure during the reaction is a disadvantage of the process, although there is the advantage that CO_2 absorption by the lime sets free a considerable amount of heat. The two reactions can be represented by $Fe_2O_3 + 1.5\ C + 1.5\ CaO \rightarrow 2\ Fe + 1.5\ CaCO_3$, with the net evolution of 11.8 calories of heat. Reduction of the Fe oxide by the CO primarily formed and absorption of the CO_2 by the lime give a net liberation of 135.4 calories per molecule of Fe_2O_3 in the reaction. From these calculations, the author assumes that the reduction of iron ores by C in the presence of burnt lime will go to completion without the addition of further heat once started, and that with a sufficiently large and properly insulated reaction chamber the heat of reaction will balance the heat losses.

Laboratory tests of this process, undertaken by Krupps of Essen, indicated that after 9 hr. about 95 per cent of the oxygen was indeed eliminated. Iron ore, coke ash and lime had not interacted, but were found side by side in a pulverulent state and could be easily separated. These experiments were made in an electrically-heated autoclave containing a mixture of 8.8 lb. of iron ore, lime and coke. After heating to 1740 deg. F., the power input was adjusted so that it just balanced the external heat losses.

Tests on a larger scale were made in a rotating pressure vessel of 4.6 ft. diameter and 4.6 ft. long. The charge consisted of 2200 lb. of a mixture of high grade Scandinavian iron ore, low temperature coke and lime, fed to the vessel at a temperature of about 1470 deg. Since, against expectations, the heat of reaction was not sufficient to raise the temperature of the charge and to cover heat losses, and since no coke oven gas was available for passing into the reaction vessel to initiate reaction and liberate heat, the temperature of the charge was raised to 1832 deg. by blowing in oxygen, and further oxygen injected for the period of the test of 5 hr. to prevent the temperature falling too much. In spite of the oxygen blown in, a reactivity of 90 per cent was attained.

The rotation of the reaction chamber had an adverse effect, since it destroyed the intimate mixture in the charge and also caused excessive abrasion of the components. This motion also forced the fine lime dust particles into the iron sponge; this was particularly disturbing, as the lime reacts with the sulphur of the ore and coal according to the equation: $FeS + CO + 2CaO \rightarrow Fe + CaS + CaCO_3$. As more lime dust is forced into the finer sponge iron grains than into the coarser grains, the most S is found in the former, about 0.2 per cent S in the case of grains below 0.2 mm. Grains above 2 mm. contained less than 0.025 per cent S, some even less than 0.005 per cent, although the ore had an average 0.05 per cent S and the coke over 1 per cent S. The C content of the sponge iron was on the average 1 per cent.

Edwin concludes from these tests that a shaft furnace with lines similar to a blast furnace is suitable for the pressure-reduction process, and he draws up two schemes suitable for Swedish conditions. In one scheme, the process is operated entirely electrically, and in the other with the aid of excess gas from electric blast furnaces. The second scheme appeals to Edwin very much as an extension of electric smelting practice, since the sponge iron, if charged to the steel furnace together with granulated electric iron, makes it superfluous to refine the iron previously.

Magnesium Casting Practice

THE foundry industry is not enlarging its knowledge and experience of magnesium proportionately to the production increase of this metal, according to a prize winning entry by J. P. P. Jones for a short-paper competition of the London Branch of the Institute of British Foundrymen. The author, pointing out that aluminum, manganese bronze and special irons are being melted and cast in many small foundries which would have looked askance at them before the war, but that these same foundries are not melting and casting magnesium, attributes the magnesium lag to the fact that the production of magnesium is in the hands of a few companies holding patent rights or licenses for the process they employ, and they in turn normally supply their metal only to casters who apply to them for a license. Such licenses were not numerous before the war, and development has been along the line of increasing the capacity of such firms rather than their number. It is possible, however, that the number of license holders may increase considerably after the war, and this alone makes greater familiarity with casting and melting magnesium desirable.

For other articles on magnesium, see THE IRON AGE, *issues of Nov. 26, 1942, March 18 and April 22, 1943.*

In the hands of the caster the metal can be used for two purposes, sand casting or die casting. Magnesium alloys can also, of course, be used for forgings and extrusion work, but this aspect of the metal is something of a specialty.

The melting procedure for die-casting differs slightly from that followed in sand casting in that a modified method is employed to allow for the fact that the metal is held in a bale-out furnace.

In sand casting, the first point which occurs is the outstanding fact that molten magnesium has an affinity for oxygen. In other words an unprotected molten surface quickly burns. This is the point in which magnesium differs from almost every other metal or alloy in common use today. To protect the surface and so prevent burning, a liberal use has to be made of suitable fluxes. There are several types of these and various methods of using them. Some casters use initially a thin liquid flux, followed by a thicker crusting flux. There is said to be a French method of using as many as three different types of fluxes on the same melt, but a procedure followed very extensively in this part of the country is to use a single flux for all purposes. All these fluxes, however, contain substantially the same basic compounds, such as anhydrous magnesium chloride, magnesium fluoride, potassium chloride, etc.; the chief difference occurs in the proportions in which these compounds are added to the mixture.

Flux to a total of 5 per cent is added to the melt at a very early stage, and thereafter continuously to maintain a cover. Before pouring, it is customary to stir the melt thoroughly. It will be observed that the greater part of the flux disappears from the surface as it absorbs the oxide and other impurities and sinks to the bottom of the pot. This is known as the washing action of the flux. In the case of magnesium the surface must not be left any length of time unprotected, and a crusting or protecting cover must be provided by a second application of flux. This is necessary as at this point it is a general practice to super-heat the metal to temperatures ranging between 1480 deg. and 1650 deg. F., and then allow it to cool rapidly—the effect of this rapid cooling is to reduce the grain size and so increase the physical properties of the casting. The metal is generally cast somewhere about 1380 deg. F.

Great care should be taken to skim thoroughly and see that no flux from the pot enters the mold, as a flux inclusion in the metal can cause considerable trouble and most frequently results in the rejection of the casting. The cause of this is the presence of anhydrous magnesium chloride — an essential constituent of the flux, but unfortunately one which is very hygroscopic. It absorbs moisture from the atmosphere, and it will readily be seen that corrosion will be set up in such circumstances.

Magnesium, unfortunately, is rather prone to corrosion troubles, but recent research seems to indicate that by adjustment of the constituents of the alloy this trouble may be largely overcome. Present practice is to protect the surface by some such method as chromating.

In molding practice, the foremost consideration is permeability of the sand; an open silica sand is generally used with a binder of a bentonite or Fulbond type. Moisture must be reduced to a minimum (5 per cent or less), and either into the sand or into the completed mold an inhibitor must be introduced. Such inhibitors are commonly mixtures of boric acid and sulphur or ammonium bi-fluoride.

(CONTINUED ON PAGE 147)

Control of Mass Production A

WHAT should arc welding specifications show? Specifications should show, in the briefest and simplest methods possible, the answers to the reasonable questions that a workman might ask about a job to which he is assigned, and that cover the technical or engineering phases of that job.

In any manual arc welding operation, Fig. 1, there is one group of factors which may be termed the manual factors in the deposition of the weld which are entirely controlled by the arc welder's skill, such as the knowledge of how to operate the equipment, familiarity with the lead, holder, etc.; the ability to strike, hold and manipulate an arc and to direct it by various motions; and manipulation to control the weld metal and to place it where it is desired in suitable quantity, and of a suitable quality to produce a satisfactory weld. These factors lie within the control of the welder himself and constitute a manual skill which is that of an arc welder. It is those factors with which an arc welder should be preoccupied while he is depositing weld metal in order to produce the best possible weld, and in as far as possible, all other questions than those pertaining to the manual factors should be answered for him before he starts his weld.

The answers to the questions which do not pertain to the manual factors can be classified as the engineering factors in making a weld. These factors constitute the questions and problems embodied in the following questions which might logically be asked by every welding operator before he strikes an arc on a welded structure:

Where shall this structure be welded?

How much weld metal should be deposited? (or How large a weld should be made?)

What is the form of the finished weld? (In other words, what is a cross-sectional view of the finished weld?)

In what position should this be welded, and in how many passes?

What type of electrode should be used for this weld for each pass?

What size of electrode should be used for each pass?

What machine setting (heat) should be a reasonable setting for this particular weld to obtain the speed desired and the quality of weld required?

In what sequence should the welds of this structure be made?

The answers to the above questions all constitute those engineering factors concerned with the deposit of any weld.

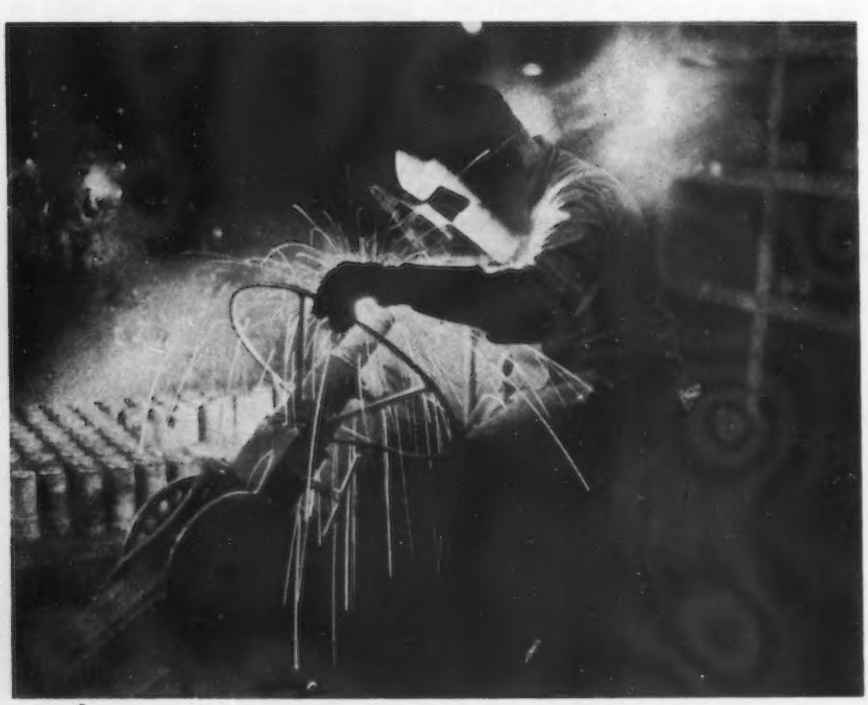
Both the manual and the engineering factors in various welding jobs differ considerably from one class of work to another. The difference between very light gage material and the welding of heavy structures predisposes a considerable difference in the specific requirements of manual skill on the part of the welder as well as considerable differences in the engineering factors involved in that welding job.

There is, however, one difference between the manual factors and the enginering factors of making a weld in that a manual factor must be learned by a process of operator education on a rather specific type or class of jobs, whereas it is possible with one generalized set of welding symbol specifications to present the answers to the engineering questions for a great variety of jobs with the same type of symbolized control specifications.

There are certain classes of welding which require more rigid specifications, where the use of well organized and standardized welding specifications are more important than in others. One classic example (the one in which probably the first and greatest progress was made in welding specifications) is that of pressure vessel welding. Another large class is that which is becoming more and more prominent in the welding industry today, that of the use of arc welding to produce machinery or equipment on a mass production basis.

An example of units which are produced on a mass production basis is shown in Fig. 2, the body fabrication department for the production of large modern earthmoving units of arc welded construction. These earthmoving structures are manufactured in lots where each production order may be 50 or 100 or more, and where a well organized production line is set up to manufacture the various substructures and structures in an orderly sequence. The individual arc welder welds the same structure on

FIG. 1—In the deposition of every weld there are manual factors which constitute the welder's skill; and there are engineering factors such as size, location, length, and other technical considerations about the weld.



Arc Welding . . .

By WALTER J. BROOKING
Director of Testing and Research
R. G. LeTourneau, Inc., Peoria, Ill.

. . . In the first part of the article, the author distinguishes those factors under direct control of the operator and those subject to engineering control. After discussing the manual factors, he then proceeds to analyze all the engineering factors and to build up a system of code symbols for concisely presenting these specifications on the blueprint. In the second and concluding part, Mr. Brooking will discuss the principles of jigging and positioning.

each of the 100 units on the order.

This type of operation predisposes the standardization of the job, offers the opportunity of job analysis and education of the welder to each individual job, and presents the maximum opportunities for the use of a system of welding specifications to answer all of the engineering questions involved on all of the structures and therefore put them completely under engineering control.

In an analysis of the different factors involved in depositing a weld, there seems to be some difference in opinion as to just what should be expected of an arc welding operator. In order to clarify the position which was taken at the outset of this discussion, namely, that the manual factors involved in a weld are all that the welder should be expected to be responsible for and the engineering factors should be made available to him in complete and concise form at the beginning of his job, a brief discussion of the manual factors will be presented, as regards mass production welding.

Manual Factors Analyzed

The process of deposition of a weld by a welding operator is one which requires his undivided attention from the instant he strikes the arc until he has broken the arc and discontinues the welding. During this process there are many steps and many problems which arise, and the successful arc welder has perfected the ability to meet the requirements of the job by a process of self-training in developing manual skill which will allow him to make the weld satisfactorily.

It is the application of this accumulated skill of an arc welder which makes him a specialized artisan whose services are purchased by a manufacturer of welded equipment, and it is to the interest of both the welder and the employer to have the operator exercising that skill as fully as possible on the job and without diverting his attention or his ability in directions other than the deposition of weld metal.

The manual factors which continually preoccupy the arc welder may be listed as follows:

A. Familiarity with welding equipment.

Early in the process of educating an arc welder, he is trained in the manual details of the use of an arc welding lead, the holder, the electrodes, the names of the tools which he uses and the correct method of their application to his particular job. He also is schooled in the habit of safe operation of this equipment and must always be mindful of the details which insure his safety and his most efficient use of the items of equipment which are his tools.

B. Knowledge of how to adjust the welding machine.

There are certain adjustments on all welding machines which welding operators must know how to accomplish as a general fund of knowledge, and the specific details of the particular methods which the welding operator is using must be familiar to him before he can satisfactorily produce welds. This is a matter of experimentation and of observation on the part of the welder. During the welding process he must continually be on the alert for slight variations in current or for indications that his machine is properly adjusted.

C. Ability to strike, hold, and manipulate an arc.

A fundamental part of the skill of an arc welder is the ability to begin a weld properly, that of striking an

FIG. 2—A view of the department for fabrication of large earth-moving scraper bodies on a mass production basis. The control and standardization of the engineering factors of welds on this large a scale becomes a matter of major economic importance.

FIG. 3—The ability to control the contour and deposition of welds on a structure such as this requires a fundamental period of training on the part of the welder. Note the size, the careful tie-ins, and the multi-pass construction of these welds.

arc and by manual dexterity and coordination of eyes and hands to hold that arc and direct it as a tool in the place where it must be held to progressively deposit a weld. The skill required to strike and hold an arc and to break an arc properly at the end of a weld, and recommence with a new electrode is a vital part of the training of a welder and an item of which he must continually be mindful during his welding work. The details of cleaning the crater at the end of a weld prior to the striking of the arc in the same place with a new electrode is one which requires attention and knowledge, and the variation of these operations from one job to another using different types of electrodes further complicates the welder's problem.

D. Ability to direct an arc to control weld metal deposition.

While depositing a weld, the welder must be continually on the alert while moving his hand, his electrode, and studying the progress of the crater with reference to the members of the joint in order to produce a sound and satisfactory weld.

This process is one which requires attention and alertness every fraction of a second that the welder is depositing the metal because a very slight variation in his weaving motion may cause undercuts or a slight difference in length of arc may cause lack of penetration, overlap, slag inclusion or any one of the various flaws which the good welder must prevent from occurring.

Variations in fitups and in cleanliness of the plates are variables which enter into this phase of the welder's operation and which continually require vigilance on the part of the operator.

A slight variation in the analysis of the plates from inch to inch of the weld may make a considerable difference in the way in which the weld metal flows and is therefore still another of the many variables which require the welding operator's full attention during the laying of a weld.

The different steps in the manipulation of the arc required for the deposition of welds in different positions are considerable, as for example, the difference between a strictly downhand flat weld and a vertical weld. To a great degree the skill of a welding operator and his classification may be based upon his ability to manipulate an arc and deposit weld metal with the joints in different positions.

E. Ability to control size of weld and form of weld during deposition.

A welder should not be expected to know how large a weld should be made to weld a joint of a given type and size using given material because that is an engineering problem which should be decided during the design of the unit. The size of the weld, however, should be conveyed to the welder before he starts to weld, as well as the number of passes which he should use to make that weld (assuming a normal fitup) since the control of the size of a weld by a welding operator is an additional matter of skill which requires attention during the deposition of the weld.

In order to produce a pass or a complete weld of a given size, the welding operator must hold his electrode at a given angle, must oscillate it properly, must be mindful of his arc length and of his speed of travel. Each of these individual items varies with the position of the work, and in order to get as high quality weld as it is possible to produce, each of these individual items must be accounted for and thought about in advance at the time when the welding operator begins to deposit the weld and also must be carefully considered during the welding process.

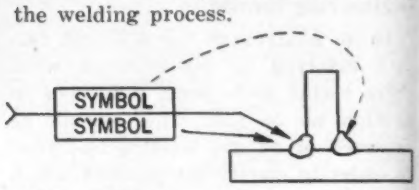


FIG. 4—The base line from which the A.W.S. Welding Symbols start is an arrow which shows the location of the weld; the position (above or below the line) of the data referring to welds on either side of a joint as shown.

If a welding operator can correctly perform all of the steps described above as manual factors in the deposition of a weld, he is doing as much as should be expected of him as a skilled craftsman. To leave up to the operator the engineering factors of where to weld, how large a weld to make, what type of welding electrode to be used, what size of welding electrode to be used, what form of joint and what sequence of welding to follow will divide his attention and detract from his best efforts as a depositor of weld metal. These are engineering problems which should be decided before he starts to work and which require technical knowledge beyond what he should be required to perform the manual factors of welding.

Welding specifications of an engineering nature, therefore, should be provided to cover each of the engineering factors not covered by the above described manual factors.

Engineering Factors in Arc Welding

The factors which should be covered by welding specifications are the questions whose answers should be given to an arc welder before he starts the process of welding the job. These questions may be listed as follows:

A. Where shall this structure be welded?

The location of the weld on a structure is a matter of considerable importance from the control standpoint, since at times joints may be welded intermittently rather than completely welded throughout. The establishment of a means of identifying each weld and where it should be welded is the first step in setting up a welding procedure and lends itself readily to the symbolizing method established in the American Welding Society's "Welding Symbols."

The use of an arrow, Fig. 4, the head of which points toward a joint, indicates the location of the weld and the placing of additional information below or above the shaft of the arrow indicates the weld on the near side of the joint and on the far side of the joint respectively. The use of a symbol of this kind will show the answer on the blueprint immediately to the question, "Where shall this be welded?"

B. How much weld metal should be deposited?

After each weld has been located, the second question of importance is, "How large a weld shall be deposited?" This is one of the most

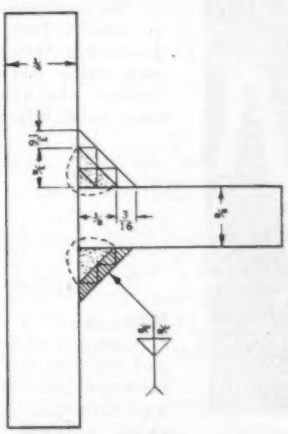


FIG. 5—Control of weld size is very important. To underweld results in failure, but to overweld is expensive. Here the weld is made only half again as large as specified according to dimensions, but contains over twice the amount of weld metal specified.

important questions in the manufacture of welded equipment because it is one of the places where the exercise of proper control is of the greatest economic importance.

For any given joint (granted a normal fitup) involving any special type and thickness of material, there is a correct size of weld (assuming sound weld metal, which should be expected of an average operator) which will satisfactorily fuse the plates together and make the welds correct. For fear of failure, this size should not be reduced nor should it be increased for very important economic reasons.

Over-welding should be condemned by inspectors just as severely as under-welding for two reasons: First, to over-weld means to greatly increase the cost of the welding process, as may be demonstrated by the diagram, Fig. 5, which shows that if a weld is made only half again larger than the specifications call for, it takes over twice the weld metal and twice the welding time to deposit.

If the size of a weld is specified properly, the arc welder then may be expected to maintain that size and will consider it a part of his job as a skilled artisan to maintain that specification. However, if it is not specified, in order to be on the sure side, the average welding operator will over-weld so that there is no likelihood of the weld failing and of his work being criticized.

Over-welding not only costs more from the standpoint of labor and materials but adds increased stresses and heat with resultant distortion and grain growth to the detriment of the welded joint. Fig. 6 indicates the method by which the size of a weld may be shown on the welding symbol shaft ,originally shown in Fig. 4, so that the welder may know what is expected of him with regard to weld size.

C. What will be the form of the completed weld (its cross-sectional view)?

The form of the completed weld on many structures is rather obvious when the joint is examined and yet, often where there is a special joint preparation, including J-type joint groove or V-type joint groove, there may be specialized views of the weld as it is completed which are not so obvious upon immediate examination of the joint to be welded.

Fig. 7 shows how a cross-sectional view of a welded joint may be shown on the symbol on the blueprint in such a way as to indicate a slightly crowned weld and an ordinary fillet type weld, a completely flush weld, a weld with unequal length legs or

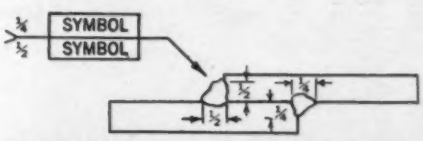


FIG. 6—The size of the weld is then shown by dimension in the proper relation to the base line. (Dimensions on welds as here shown on the structure are only to show what the symbol indicates, and would not otherwise be shown.)

other specialized welds may be indicated similarly.

D. What position should this weld be deposited in (overhead, vertical, fillet, flat)?

With special reference to repetitive mass production welding jobs, the answer to the foregoing question is a very important one for several reasons. In the first place, it is well recognized that a weld which can be made in the downhand position (completely flat) can be made more quickly, with greater assurance of soundness and good appearance and by a less experienced welding operator than to deposit the same weld in any other position.

On a repetitive job, fixtures may be supplied whereby a unit may be welded with each weld on the structure consistently deposited in a certain position from one structure to the next. Therefore, it becomes reasonable and profitable to specify in the welding symbol system the position in which a given weld shall be deposited. It presents the welding operator with a written order to deposit the weld in the most desirable position from the standpoint of economy of procedure and sequence on that particular structure.

Without such specification, it is not unusual for welds which could be made in the completely downhand position to be deposited in the horizontal fillet position or sometimes even the vertical position simply because the welder feels that the additional handling to position the weld is more difficult than it is worth.

If the welding engineer is expected to put down the specifications for the position in which the weld shall be deposited, due thought should be given as to how it shall be done economically in the jig and fixture design.

Fig. 8 shows one method of prescribing the position in which a weld shall be deposited along with the regular symbol which shows the size of the weld, location of the weld, etc. The symbolized letter "V" for vertical, "O" for overhead, "H" for horizontal, "L" for fillet, and "F" for flat serves the purpose satisfactorily.

E. How many separate beads of metal should be used in this joint?

The answer to the number of passes required on a normal joint of a certain size on a certain structure is an engineering detail which should not be underestimated in importance nor should it be left to the welding operator to decide.

It might not be inconceivable that

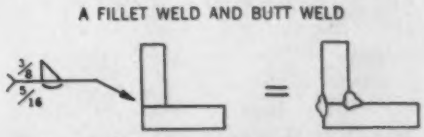
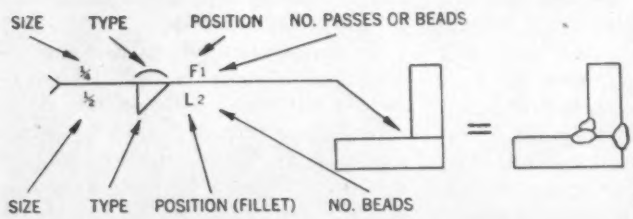


FIG. 7—This diagram shows how the form of the weld (its cross-sectional view) may be shown on the blueprint to help the welder visualize the weld.

a ½-in. fillet weld deposited in the downhand position might be made in one pass on certain joints and might not be made satisfactorily on other joints in two passes. On certain structures, the best assurance of a good weld is that a given number of passes be made on a particular joint (granting a normal fitup). It may be that the preheating effect of a small pass put in prior to the deposition of the large volume of weld metal in the joint is required to get proper fusion. This phase of the procedure may be specified on a print as shown in Fig. 8. The number after the letter designating the position in which the weld will be made, indicates the number of passes to be made in the joint.



LEFT

FIG. 8—For showing the position in which a joint is to be welded, and the number of beads (or passes) to be used, the letter indicating position and the number indicating number of passes are very satisfactory.

There is a reasonable limit to the size of the weld which can properly be deposited in one pass, and if that limit is exceeded, either penetration will not be achieved or it may be that grain growth will occur which will substantially weaken the structure of the weld metal itself.

F. What type of electrode should be used in this weld?

In almost any welding shop there is more than one type of welding electrode available. Usually there is the AWS E6010 type of welding rod for all-purpose welding and all-positioned welding. There also is likely to be the AWS E6012 type weld for all-positioned welding where the fitup is not consistently good. A third type of electrode for almost any shop, which has studied its welding procedures and has taken advantage of the greater speed and efficiency of positioned welding, will be available in the AWS E6020 type of electrode which is specialized for downhand positioned welding.

With this variety of electrode available in a welding shop, full advantage of the specific application of each type of welding rod to each point on a structure should be made and further, full directions to the welding operator as to which electrode should be used on a particular joint, as described by the welding engineer, should be given so that the welding operator may know what is expected of him on that part of the welding job.

The earthmoving unit (an Angledozer bowl) shown in Fig. 9 is an example of a unit where it is economical to specify the E6020 type welding electrode for long welds, and E6012 for others on the unit.

There may be times when it is essential that a certain type of welding electrode be used in a joint in order to give the strength or the appearance of other qualities to that weld which cannot be obtained by the use of any other electrode. If the choice of electrode is left to the welding operator, he naturally will use his preference as to the electrode which he thinks will be the easiest to use or may be most readily available, neither of which may be the particular type of electrode which the engineering department would desire on that particular joint.

Fig. 10 shows the method by which this information may be presented on the welding symbol setup to indicate the type of electrode to be used.

o o o

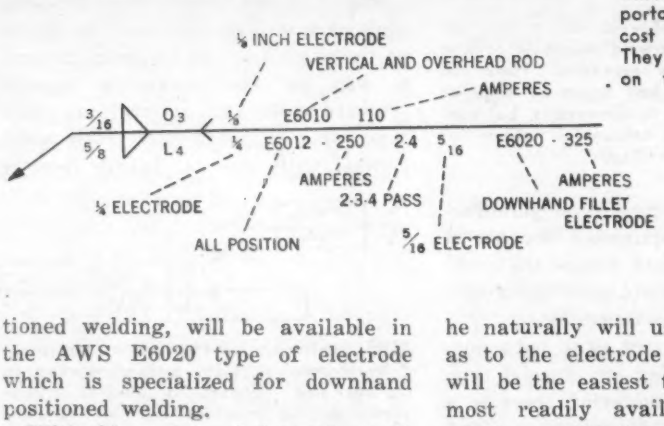
LEFT

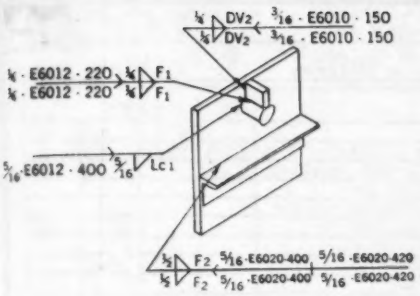
FIG. 9—Often it is not economically practical to position structures for 100 per cent downhand welding. Such is the case on this earthmoving unit. To specify fast flowing, downhand electrodes for long welds and an all position electrode for other welds is profitable.

o o o

BELOW

FIG. 10—Type of electrode, size of electrode and machine setting for each pass are engineering factors, each of which represent an important effect upon the cost or quality of welds. They may be designated on the print as here shown.





PRINT A

G. What size of electrode should be used for each pass?

Hand in hand with the type of electrode to be used for each welding joint should be shown the information as to the size of the electrode for each pass.

It is often essential that the first pass be made with a small electrode and that the second pass be made with a larger electrode to give the maximum speed of deposition and proper penetration for a particular weld. Without being specifically told the size of electrode desired, the operator may make all of the passes with the large electrode and not get proper fusion or penetration.

In Fig. 10 the size of electrode is presented as a fraction preceding the type of the electrode shown in the symbol.

H. What machine setting (heat) should be used for this welding joint?

Within certain limits, any skilled welder would use a certain heat for a given size and type of welding electrode. Yet there are times when to give the welding operator a specific limit to work to allow him to deposit weld metal at the maximum safe speed and heat, whereas he might not use the maximum heat allowable and would therefore increase the length of time required to deposit certain welds. On the other hand, he might use more heat than he should have and therefore jeopardize the quality of the weld. In Figs. 10 and 11, machine settings for each electrode are shown as a number of amperes or by dropping the last zero on the ampere number (20 for 200, 40 for 400, 45 for 450). This question of machine settings should be carefully studied and prescribed by the welding engineer and it should be understood by the operator that it is for the normal job with a normal fitup. The setting specified should be checked occasionally with an ammeter when the welder is actually welding so that his welding heat may be indicated to him accurately, a condition which is not always true when he sets his machine by the bow indicator on his machine.

Fig. 11 shows a print of a structure

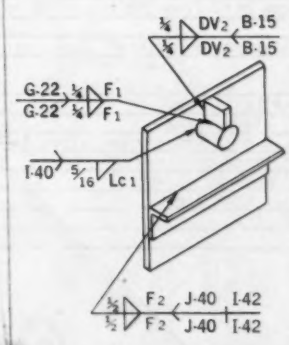
LEFT

FIG. 11—Example of the complete symbol control of engineering factors on a blueprint of a structure. Such a print would also show fitup dimensions and separate part identifications. (See Fig. 12 for more symbolized but simpler means of showing the same welding information.)

o o o

LEGEND:
G-22 · ¼ · E6012 · 220
I-40 · 5/16 · E6012 · 400
B-15 · 3/16 · E6010 · 150
J-40 · 5/16 · E6020 · 400
I-42 · 5/16 · E6020 · 420

FIG. 12—The symbolized information in Fig. 11 is simplified and grouped as shown on all production items in the shops of one of the major producers of modern arc welded equipment on a mass production basis.



PRINT B

o o o

(without setting up dimensions) with complete weld symbols as it would be used in the shop.

According to standard practice on all production items in one large manufacturing organization, the information shown in Fig. 11 is further symbolized and "boiled down" as shown in Fig. 12.

I. What sequence of welding should be used in the welding of these different joints on this structure?

In a manufacturing organization where the welding operations are standardized and where separate fixtures are made for substructures and structures, the sequence of welding can be organized around the process of putting parts into the fixture and welding the parts, step by step in an orderly procedure. The sequence for a simple structure usually revolves itself into starting with a particular weld and welding as the part is turned in the fixture until the last weld has been made.

For complicated structures such as the one shown in Fig. 13, or structures where the sequence of welding

BELOW

FIG. 13—In order to standardize the sequence of welding on such structures as this one, an operation sequence sheet is a very practical device. (See Fig. 14.)

should be made in an irregular fashion (different than they present themselves in the normal turning of the fixture), it is very effective to build up a simple welding sequence check sheet which may be presented with the blueprint to the operator and which shows the order in which the welds on the structure are to be welded. Such a sheet is shown in Fig. 14. It may be incorporated into the blueprint on the tracing (if it is not too long and can be done without crowding the information on the print) thereby simplifying the instructions by having them all in one piece. The welder soon learns the sequence and follows it without need for reference to the sheet after the first few units are built.

With the answers to all of the foregoing questions in mind, the welding operator may proceed to start his arc after he has positioned the weld, selected the correct welding rod and set his machine properly. He will then deposit the weld metal in accordance with the desires of the welding engineer or the engineering department by giving his full attention to the problem of meeting the specifications on the blue print.

Wherever this degree of control is established and followed, expensive over-welding and lost time on the part of the operator trying to figure out what he should do and how he should do it will be eliminated for all practical purposes. A considerable increase in the degree of economic advantage will be realized by the establishment of such a control for any mass production welding operation because it standardizes the operation and therefore standardizes the product and because it carries properly engineered series of operations to effective conclusion without dividing the attention of the skilled operator from the essential things which he is expected to do, namely, a perfect job of manually depositing weld metal.

(To be concluded)

OPERATION: Setup and Weld

Cl. Tournapull Deck Plate Structure R1964

ELEMENTS	OCCURRENCE			
1st. Operation				
1. Pos.& clamp ball base & main plate in jig				
2. Pos.& tack side plates & hitch ball base to plts.				
3. Weld side plt. to hitch ball base 1st pass				
4. Turn and weld side plts.to main plate, outs & ins				
5. Turn, weld side plt.to ball base 2nd pass				
6. Turn, pos.& tack top plt.to side plts.				
7. Turn, weld top plt.to hitch ball base				
8. Turn, weld side plt.to main plt. (top)				
9. Turn, weld side plts. to top plate				
10. Turn, weld side plts. to ball base (ins)				
11. Turn, pos. and tack gussets				
12. Turn, weld top gussets to top plt.				
13. Turn, weld side gussets to side plts.& top gussets				
14. Turn, weld side gussets to main plt.				
15. Turn, weld gussets & top plate to main plt (end)				
16. Turn, pos. tack & weld cover plt. rings				
17. Turn, remove box beam (jig)				
18. Pos. tack & weld rounds to main plt.				
19. Remove str. from jig and stamp symbol				
20. Straighten deck plate				
2nd. Operation				
1. Load str. on jig				
2. Pos. & tack kennels and pipes to str.				
3. Weld pipes to str.				
4. Weld kennels to str.				
5. Unload from jig				

Name _____

Badge Number _____

Shift _____

Date _____

FIG. 14—This check sheet gives the operational sequence for both the setup and the welding of a complex welded structure. The welder soon learns the sequence, and follows it because it is the way in which he learned to do the job first.

Iron and Steel Corrosion Prevention

NOTWITHSTANDING the excellent results obtained in commercial pickling, a piece of steel plate examined under a low-power microscope is found to have numerous very fine particles of black oxide embedded in it, and these only require an electrolyte, such as water, to start corrosion, it is pointed out by V. C. J. Nightingall, in the Australian *Journal of the Institute of Engineers* for November, 1942. When all mill scale has been ground off, galvanic couples can be set up by differential aeration from any aqueous electrolyte.

A process of cathode protection has been developed which consists of fixing zinc in powder form to a chemically prepared iron or mild steel surface in such a manner that some of the zinc is embedded in a silicate of zinc matrix of high electrical resistance, which is sufficient to prevent the short circuiting of at least some of the zinc held in the matrix to the iron or mild-steel surface. Not much is known regarding the mechanism of the attachment to the iron surface; the action takes place immediately, and the zinc coat is firmly fixed after heating to 230 to 250 deg. F. for 10 min., after which the main body of the zinc silicate adheres to the zinc and iron surface. The coating acquires a secondary hardness after about one month's weathering.

The cathodic reduction of mill scale has led to the successful development of a process for the reduction of scale or rust existing on mild-steel surfaces where water is constantly present, for example water cooled roofs to petrol tanks in hot climates. In this, the first coat is employed to reduce scale and rust by the action of hydrogen; this action is allowed to continue for 12 to 18 months, when the scale and rust are reduced sufficiently to brush the surface down with a steel brush. Another coat is then applied and the treatment continued twice in three years, after which it is found that no further corrosion takes place.

New Equipment . . .

Presses

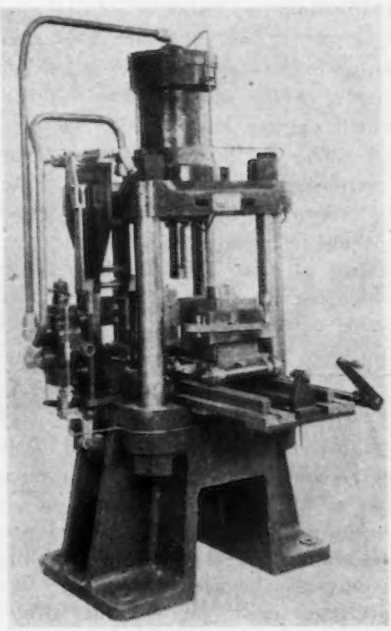
New developments in hydraulic and hand presses and related sheet metal machinery are described in this week's issue.

THE Junior hydraulic press line has been expanded by the *Colonial Broach Co.*, 21601 Hoover Road, Detroit 12, to include presses of 1 ton capacity as base type machines, in addition to the bench models. Pull-down type broaching operations requiring coolant may be performed on these units. Puller mechanism and coolant tank are located in the base, with a motor-driven coolant pump on the rear. Pump and reservoir for the hydraulic fluid are incorporated in the

main body of the press. Ram speed is 30 ft. per min. downwards, with return speed of 60 ft. per min. for the upstroke. The stroke is adjustable up to 12 in. For assembly operations both the base and bench type models are available without coolant reservoir and coolant pump.

Hydraulic Press

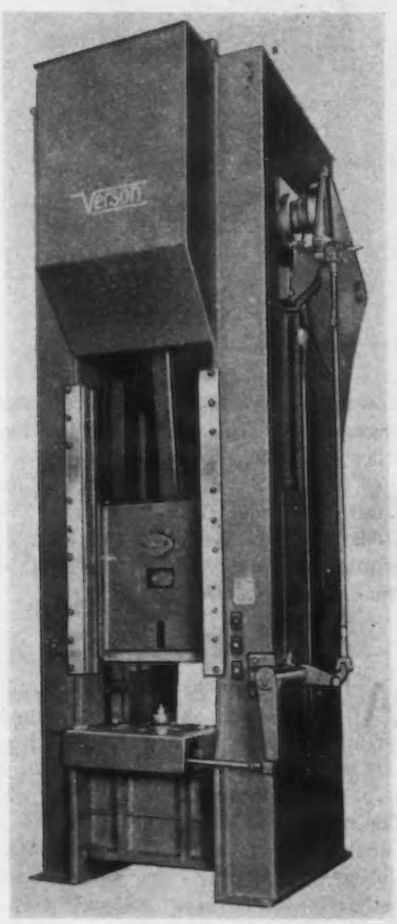
IDENTIFIED as Series K, a new type of hydraulic press has been built in 25, 75 and 100 ton sizes, adapted to capacities up to 150 ton by *Hydraulic Machinery, Inc.*, 12825 Ford Road, Dearborn, Mich. They are operated by separate motor driven power units, manually controlled with



a four-way valve. The frame of the press is made up of heavy castings bolted together by steel tie rods with the power cylinder assembled vertically on the top. In the unit pictured, two lower dies are shown mounted on a shuttle. One die is under the loading machine, while the other is under the ram. The press occupies a floor space of 25 x 50 in., and the power unit may be installed in another room or building.

Drawing Press

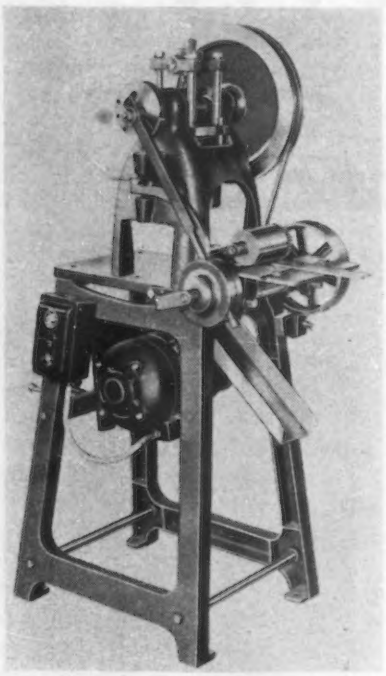
THE Verson Allsteel Press Co., 93rd Street and Kenwood Avenue, Chicago, has designed an eccentric type cartridge case drawing press which produces both brass and steel cases. Presses are built for all stages of case fabrication, with sizes available to make cases up to 105 mm. Equipped with a dial feed, it can make as many as 15 productive strokes per min. Dial is tied into the press circuit. The pneumatic clutch



and brake unit is electrically controlled. Extra long gibs securely confine the slide at all positions of the stroke. Front gibs are adjustable, and all gibs are bronze lined.

Automatic Stamping Press

VARIABLE speed control between 180 and 550 strokes per min., arrangement for addition of spacers to provide a die space to 5¼ in., and provisions in the ram to permit boring it out for punch shanks to 1-9/16 in. are included in the Diebel Hi-Speed stamping press manufactured by the *Di Machine Corp.*, 3654 Lincoln Avenue, Chicago. The press includes an integral roll feed for strip stock up to 4½ in. wide. The head design includes a cylindrical ram measuring 4 in. in diameter and an inserted pitman screw. The bronze pitman faces



upward, and carries a steel screw that engages adjustment nuts on the two sides of a 1-in. steel crank-pin assembled in a head which connects by four studs to the cylindrical ram. The stock feed is driven by an adjustable crankwheel and rack on the end of the crankshaft.

Plate Punch

A PLATE punch and layout table capable of handling rectangular and odd shapes has been placed on the market by the *Thomas Machine Mfg. Co.*, Butler Road, Pittsburgh. The machine is equipped with floating punch stem and electrically controlled clutch. Plate rollers are mounted on anti-friction bearings and permit the handling of narrow plates, with the first rollers on either side of the punch mounted on springs. The plate is clamped to a heavy channel section carriage, running lengthwise of the table, and controlled by a rack and pinion, with handwheel located on the operator's platform. A spacing attachment may be installed which permits spacing of holes longitudinally, and with a special attachment, spacing may also be done crosswise. Controls are located directly in front of the punch. Two handwheels, which move back and forth with the table, enable positive control.

Extrusion Press

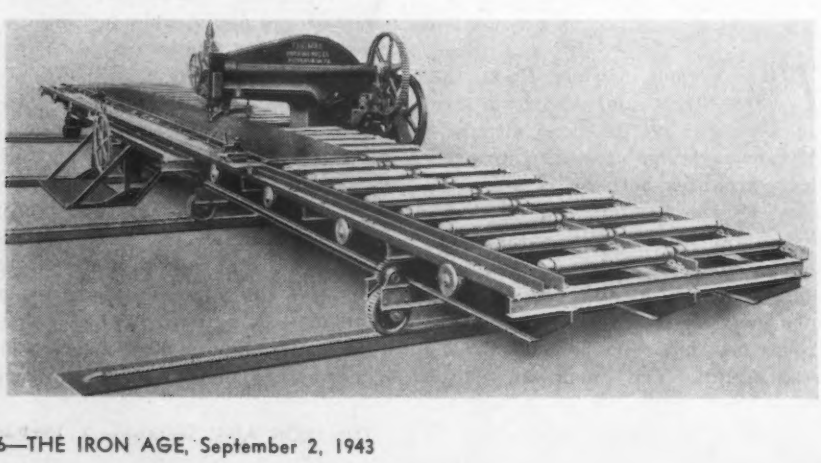
EXTRUSION presses which are said to produce tubes of uniform wall thickness without frequent readjustments of tools and machinery parts have been put on the market by the *Schloemann Engineering Corp.*, 1149 Empire Building, Pittsburgh. The platen and container holder are supported in the centerline of the container, which carries keys laterally which engage keyways in the housing. This method is said to permit expansion and contraction of platen and container holder in all directions without losing alinement with the centerline of that part of the machine which carries the press stem and remains cold.

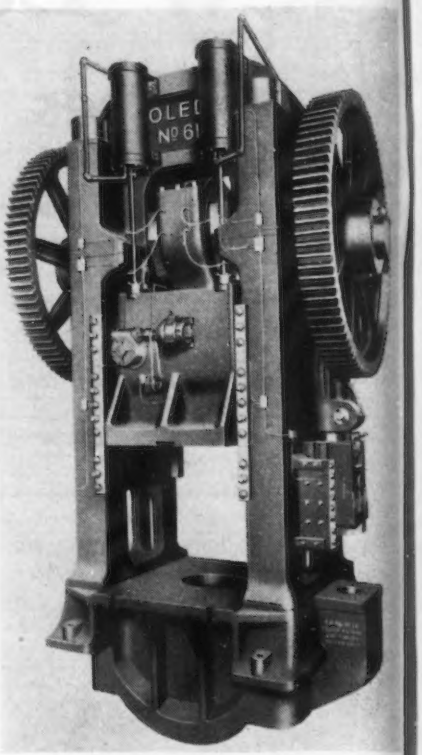
Drawing Compound

THE Magnus Chemical Co., Garwood, N. J., has developed a new metal coating compound for application as a dip coating to high or low carbon steel wire, copper coated wire and stainless steel wire after pickling. It may also be used for coating steel cartridge cases or similar drawn shapes before drawing. The process is said to be cleaner and more economical than previous procedures, and results in more satisfactory drawing with better metal surface and longer die life.

Mechanical Trimming Press

CAPABLE of trimming the average run of forgings as they would come from the hammer of approximately 33,000 lb. capacity, the



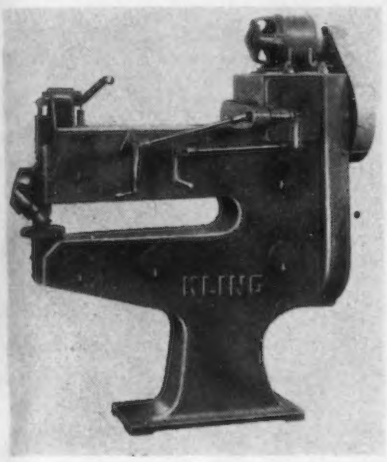


mechanical trimming press recently shipped by the *E. W. Bliss Co.*, 53rd Street and 2nd Avenue, Brooklyn 23, N. Y. is claimed to be one of the largest ever built. Operating at five strokes per min., it is triple geared with twin drive on the crankshaft. The Bliss multiple disk flywheel type air friction clutch and brake with electric push button control is used on the 450,000 lb. giant. Specifications are: Stroke of slide—24 in., counterbalanced by air; shut-height-distance top of bed to slide, stroke down adjustment up—42 in.; slide area F to BXR to L—87 x 60 in.; bed area F to BXR to L—98 x 72 in. A four-piece tie-rod frame construction is employed.

Rotary Shear

WITH the rotary shears developed by *Kling Bros. Engineering Works*, 1300 N. Kostner Avenue, Chicago, it is said to be possible to shear any shape desired, including parts with very small radii, right or left-hand. Attachments are available for all these functions. The shears can also be equipped with rolls for beading, U-ing, wiring and forming operations. All high speed shafts are mounted on anti-friction bearings, while the slow speed shafts are provided with large bronze bushings. The cutter shafts are equipped with thrust ball bearings. Drive from the motor is by V-belt with all the gearing at the back of the machines running in an oil bath. Friction clutches permit

shearing speeds to be changed by simply shifting the clutch from one position to another. Cutters are made of oil-hardening tool steel. A gib key provides for any take-up resulting from wear on the cutter heads. Rapid setting of the cutters in the proper shearing relation is provided by an adjustment on the lower cutter shaft. The units are made in six size models, with maximum shearing capacities ranging from ⅛ to 1 in. plate.



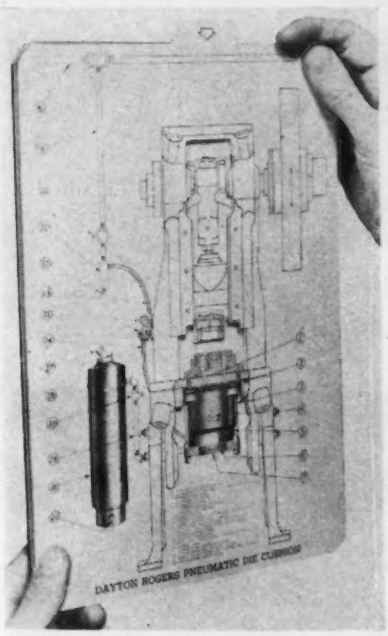
Foot Operated Press

THE FO2 foot operated press for forming, cutting, piercing, riveting, stamping and other light operations has been designed by the *Ferracute Machine Co.*, Bridgeton, N. J. A kick of the pendulum lever operates the ram while the weight of the lever returns the ram to the initial position. It can be furnished alone for bench

mounting or with a cast pedestal. Presses of similar design are available in one and three ton capacities.

Die Cushion Working Model

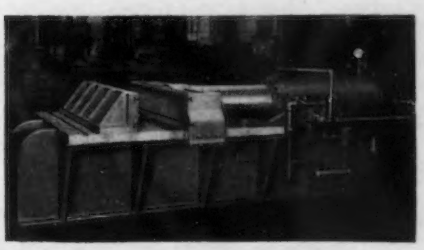
THE *Dayton Rogers Mfg. Co.*, 2835 12th Avenue South, Minneapolis, is now offering for free distribution a die cushion cutout model showing the details of the working principles of pneumatic die cushion equipment as applied to the average punch press. It shows how the blank is automatically held in tension; how the press tools produce a strong, smooth shell throughout the work cycle of the draw die; how a single action press is used in place of a double action press, or where a double action press can be used in place of a triple action press; and gives complete details as to the basic working



parts of any standard die cushion, together with complete piping diagram for the installation and use of pneumatic die cushion equipment.

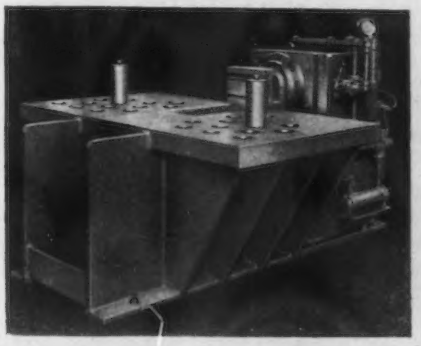
Hydraulic Bulldozer

A 200-TON hydraulic bulldozer has been produced by the *Beatty Machine & Mfg. Co.*, Hammond, Ind., for use in a war arms plant, but the machine may be used in all heavy metal working industries. Specifications are listed as: Table, right to left, 60 in.; stroke, 36 in.; shut height, 16 to 24 in.; maximum opening, 60 in.; ram head, 12 x 60 in.; resistance lug, 12 x 60 in.; pressing speed, 20 in. per min.; and return speed, 60 in. per min.



Hydraulic Bender

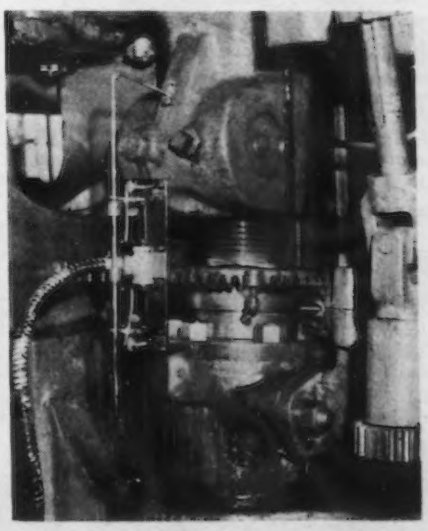
A NEW hydraulic bender has been offered by the *Beatty Machine & Mfg. Co.*, Hammond, Ind., for pipe bending, straightening, pressing and forming of light structural and welded shapes. Ram is 12 in. wide x 9 in.



high, provided with T-slots for mounting dies. Table has 26 holes for location of 4 in. diameter bending pins in various positions to facilitate bending and straightening of odd shapes. The press is built in capacities from 35 to 200 tons.

Limit Switches on Presses

DAMAGE to pitman screws on a large punch press equipped with motor drive for raising and lowering the ram is eliminated in the Mansfield, Ohio, plant of the *Westinghouse Electric & Mfg. Co.*, by the use of limit switches. These switches prevent the die setter from jamming the pitman screws or running them out too far, resulting in the screws bending under heavy loads. The switches



are used only when changing the ram adjustment to suit the various dies used. They are connected into the electrical circuit of the adjusting motor, and are operated by stops mounted on a rod fastened to the connector pitman.

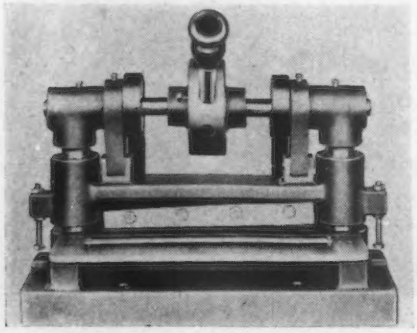
Roll Grinder

TO facilitate maintenance of roll forming machines the *Yoder Co.*, 5500 Walworth Avenue, Cleveland, has brought out a roll grinding machine of 16 in. capacity and 20 in. length between centers. It has manually synchronized table and cross feeds; 2-speed table feed; 9-speed work head drive; no belt or gear

change; precision built high speed spindle; dust protection, and centralized controls.

Precision Hand Shear

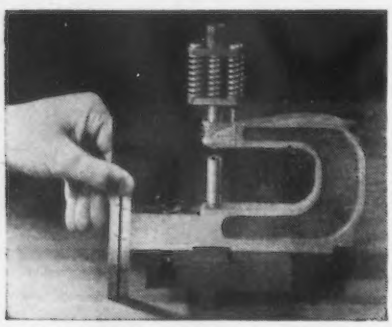
THE Di-Acro shear No. 2, put on the market by *O'Neil-Irwin Mfg. Co.*, Minneapolis, is claimed to be suitable for precision work on light and medium gage metals and materials that cannot otherwise be rapidly worked to accurate tolerances with a hand-operated scissors shear or with a heavy foot-operated floor-type shear. It can be adapted for developing accurate shapes in bi-metals, sensitized materials, mica, varnished cambrics, fiber slot insulation and other dielec-

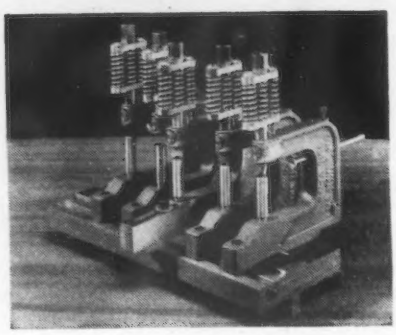


trics, and materials required for the manufacture of precision instruments and recording devices. Accurate squaring, slitting, stripping and notching to die accuracy is provided by adjustment of material guides, blade pitch and stops.

Punching Unit

ANNOUNCEMENT of a new type CA hole punching unit model with built-in adjustable adapter has been made by the *Wales-Strippit Corp.*, North Tonawanda, New York. With a master pattern as guide, it is possible to locate the units in exact position by sliding them along the rail. In cases where the holes are not in a straight line pattern, the units can be located up to 1½ in. front to





back with this new adapter. The punch and die are held in alinement by the holder and are removable for interchangeability. The three-spring selective stripper provides ample stripping pressure to strip any metal the punch will penetrate. The units are available to punch holes up to 5/16 in. diameters. The company also offers Type B hole punching units and adaptors with maximum front to back adjustment of 3 in.

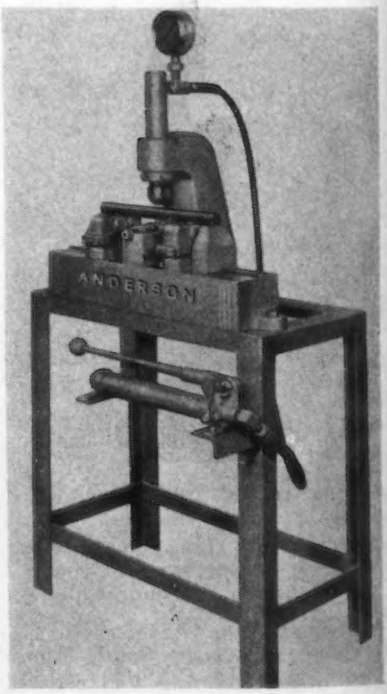
Long Thrust Fastener

PERFECTION of a special long thrust fastener specially designed

to hold in alinement and in clamping position extraordinary thicknesses of sheet material is announced by the *Prestole Div., Detroit Harvester Co.*, 5450 West Jefferson, Toledo. It is a companion tool of the Prestite Safe Skin holder now used in aluminum skin assembly in aircraft industries. The device was designed to meet the problem of clamping heavy sections of materials, and provides heavy spring tension to hold the sheets tightly together and long travel of the clamping element of the fastener in order to clear through such thicknesses of metal.

Hydraulic Hand Press

THE design of the press introduced by *Anderson Bros. Mfg. Co.*, 1907 Kishwaukee Street, Rockford, Ill., is claimed to eliminate moving shaft from anvils to centers for checking. Checking and bending is done in the same position. When pressure is released, the spring tension on adjustable rolls brings the shaft free of the anvils and free to rotate for checking. An indicator gage calibrated in thousandths for locating high and low spots on shaft, and a pressure gage calibrated in pounds is provided. The unit was built to handle work up to 1½ in. in diameter, and will be made in larger sizes. It is operated by a hand hydraulic pump and has a capacity up to 20,000 lb.



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1. Apply large forces through long . . . or short . . . strokes at variable speeds?
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4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R P M or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
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12. Obtain accurately matched speed of various rotating elements?
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14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

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Assembly Line

STANLEY H. BRAMS

• Packard in output on new advanced type of supercharger, for P-51 installation . . . Manufacture of spare auto and truck parts is lent encouragement by Washington.

DETROIT — Inbuilt, two-speed, two-stage superchargers are being manufactured on a production basis for the first time for installation in aircraft engines of this country's output. The work is being done at the Rolls-Royce division of Packard Motor Car Co.

These engines are now being used to power the North American P-51 Mustang fighter, hitherto equipped with Allisons. Utilizing the new supercharger, power going into the propeller at 30,000 ft. has been increased to more than 1500 hp., up about 600 from previous output at this altitude. The effective range of the P-51 is thereby increased about two miles, and its speed in high altitudes may well be the fastest in the world today—fulfilling more completely the glowing promise held out for the P-51 and achieved in increasing measure since it first sped onto the military horizon a year or so ago.

Packard and Rolls-Royce engineers collaborated on development of the supercharging unit. American influences are evident in the utilization of one shaft and one gear train for both rotors. The shift from initial to secondary speed is effected by means of an overriding clutch, somewhat similar to that used on an automobile overdrive. The change in speed is automatic, actuated by a pressure altitude switch which closes when a specified altitude is reached. In descending flight, incidentally, the switch reopens at a level about 2000 ft. below the closing level, to allow overlap and maneuvering at transitional altitude.

Installation of the new supercharger necessitated engineering changes in several parts in the Rolls-Royce engine. Pistons and rings had to be redeveloped, and other parts had to be strengthened. The various changed specifications are being gradually installed in both types of engines now being turned out at Packard as a measure of production simplification.

The single-stage supercharger will be continued in production for some time to come, but projections call for a gradual switch of all output to the newer type. One or another of these Rolls-Royce Merlins are being used today to power P-40F Warhawk fighters, Hurricanes, four-motor Lancaster bombers and Mosquito fighter-bombers, as well as the P-51't.

Like its predecesor, the new supercharger is installed at the rear of the engine. Directly forward of this installation is an after-cooler, reducing the temperature of the then-compressed air about 30 per cent before it is drawn into the cylinders. This heat exchanger utilizes its own coolant, circulated by its own pump; the coolant is the same as that used in the engine itself, but it is held at considerably lower temperature.

To produce and assemble the more powerful job, Packard had to set up a department which includes 476 machines. Deliveries on these have been completed, production having been under way about three months, a fact unreleasable until now.

HANDLING of the enlarged production schedules for the Rolls-Royce engines required Packard to expand its circle of major subcontractors, and it dipped into the machine tool ranks for help. One of the new parts producers for Packard is Warner & Swasey Co., Cleveland, which is manufacturing an estimated $500,000 in clutch assemblies per month. Warner & Swasey in turn is subcontracting a share of this production order, believed to be one of the first of magnitude yet undertaken by a machine tool company.

Packard is also negotiating with other equally prominent firms in the machine tool field to produce other of its requirements. In all, the Detroit company now has 350 subcontractors on its list, this total not including suppliers who operate on purchase orders rather than actual subcontracts.

Output of Rolls-Royce engines has accumulated now to a total well in five figures at the Detroit factory, this volume having been accompanied by a full 38 per cent complement of spare parts.

Added efficiency achieved during the past year has made it possible to reduce the cost of Rolls-Royce engines to the military purchasers by a considerable sum, believed to approximate 20 per cent of the total. July sales, it might be added, grossed $33,000,000 for the company, including motors and spares for both the Rolls-Royce job and the Packard marine engine, the latter of which is also being made in constantly increasing volume. The reducing levels of cost, achieved while substantial tooling costs were still being absorbed, point a rather good case for fixed fee contracts, it might be added, inasmuch as this type of arrangement prevails on the Rolls contract.

Some of the requirements for Packard's engine program will be produced at the new Toledo Division of the company, acquired recently after the Army cancelled production plans for the Liquid Cooled Engine Division of Aviation Corp., and already put into limited operation by Packard.

On the general subject of superchargers, it can be stated that they are receiving more and more concentrated attention as the air war goes higher. As a general belief, it appears that inbuilt units, such as Packard is making, are the likeliest installation for compact fighter ships, while turbo-superchargers, operated by exhaust gases rather than motor power, are better fitted for use on bombers where the weight increase involved is not so significant.

A wide variety of supercharger combinations is in experimentation at this time, including inbuilts, turbos, and combinations of both, and including as well an infinite number of combinations of speeds and stages. Progress in this field is keeping good pace with the forthcoming important developments in aircraft.

REPLACEMENT parts manufacturing is being given a shot in the arm by WPB, but whether the medicine will provide a quick recovery is yet to be seen. Nearly all producers have now received back their allocations under CMP for manufac-

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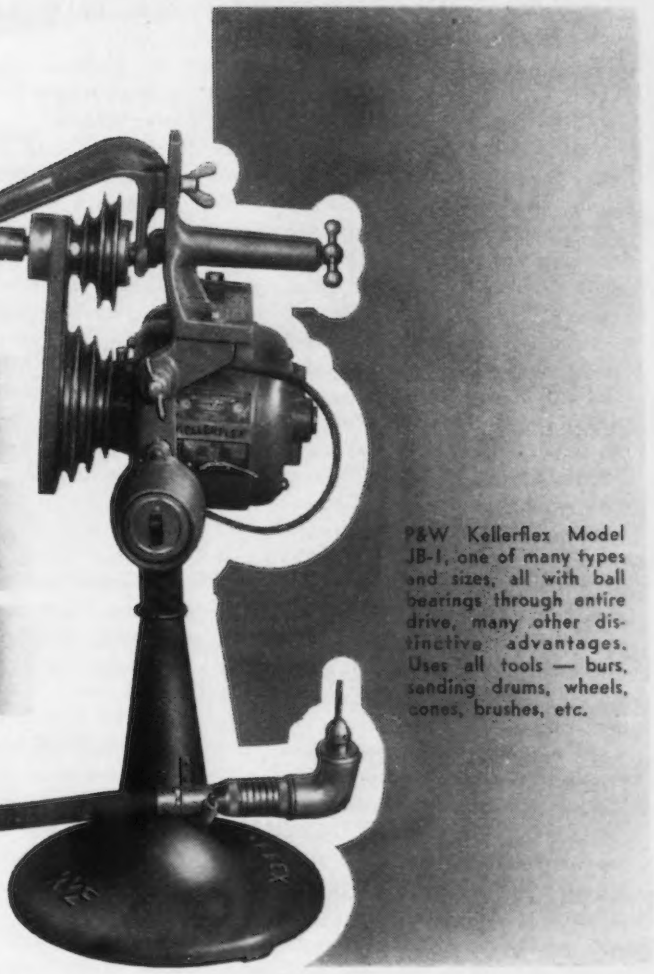


P&W Kellerflex Model JB-1, one of many types and sizes, all with ball bearings through entire drive, many other distinctive advantages. Uses all tools — burs, sanding drums, wheels, cones, brushes, etc.

BY COMPARISON with other Pratt & Whitney machines, the P&W Kellerflex is little . . . but it's doing some mighty big jobs, and has earned a big reputation.

Kellerflex has the same top qualities you'd expect of equipment built by the makers of such super-accurate machine tools as P&W Jig Borers, Gear Grinders, and the rest. It's a flexible shaft machine — with a difference: *stamina, strength, extra* ease of handling. Built in many sizes and types, with a full line of accessories, Kellerflex handles countless tough jobs — buffing, burring, drilling, grinding, die finishing, polishing, lapping, sanding, snagging, wire brushing, and many others.

Of course you want to use flexible shaft equipment to speed production, save manpower, improve quality. When you buy, choose *Kellerflex* for *long, dependable* service . . . then you'll be equipped for a flying start at your post-war production. Write for details. Thanks to increased facilities we offer PROMPT DELIVERY to priority-holders. PRATT & WHITNEY, *Division* Niles-Bement-Pond Company, West Hartford, Conn.

KELLERFLEX

turing of parts for both passenger cars and trucks during the fourth quarter. Allocations have been practically 100 per cent of applications, but these particular authorizations quite likely have come too late to do much good, bye and large, during the quarter which begins in October.

Washington is moving, however, to neutralize some of the ill effects which will be caused by the late fourth quarter allocations, by means of substantial extensions through the first three quarters of 1944. Carbon steel requirements, allocated practically as requested for the fourth quarter, are now extended through the three succeeding quarters at a uniform 100 per cent level. Alloy steel allocations, set at 100 per cent for the fourth quarter this year, are being extended on that same level for the first 1944 quarter, and are further allotted at 80 per cent for the second quarter and 50 per cent for the third. Extensions hitherto were made on a rough 80-60-40 per cent scale for forward periods.

This is of long-term rather than short-term effectiveness. To bolster the immediate and again-serious situation on spare parts, WPB is moving to amplify its allocation aids by issuance of scattered directives to some manufacturers to increase their output of critical requirements. Axle and bearing makers have received such directives in the recent past, the recipients evidently including both producers of such critical components and others whose facilities are loaded with war orders.

The replacement parts program, despite this aid from WPB on materials, is strewn with pitfalls of worrisome size. The demands for spare parts are quite naturally enlarging as the average age of cars and trucks on the road continues to lengthen. The normal producers of such requirements have, in the main, converted over to manufacture of war goods, and in so doing have retooled a portion of their equipment to the point that reconversion is impossible if the war work in their shops is to continue unimpaired. Faced with this stuation, WPB has explored the possibilities of converting some small plants to parts manufacture, but little success has been realized, mainly due to shortages of manufacturing equipment of the same types which are preventing resumptions of war in the plants which customarily turn out such requirements. The always-present problem of manpower is at hand, too.

THE replacement parts which must be made today of scarce steel by scarce help are quite definitely necessary. The National Highway Users Conference recently pointed out that about 50 per cent of the passenger cars in use today are owned by essential war workers. A cooperative study of the conference and various government bodies, not yet completed, indicate that 40 per cent of vehicles classified are owned by agricultural, transportation and mineral mining workers. Another 20 per cent belong to workers in "construction, manufacturing or governmental industrial groups, all of which contain large numbers of essential workers." To add to the problems involved in obtaining spare parts for maintenance of these vehicles, the indication is that the cars of greatest age—those requiring the most servicing—are owned in the unskilled labor and agricultural classifications.

These findings build up a definitely good case for adequate spare parts manufacturing, but the problems of obtaining steel first, then facilities, then manpower, are such as to impair severely the good intentions of the matter. The procurement of steel by the spare parts makers, all but impossible in the oncoming fourth quarter, promises to be only modestly simpler in the months after the turn of the year.

Sheets, required for stamped parts, cannot be placed on many mill books for a number of months ahead, as automotive companies have found in recent weeks when they attempted to place allocations freshly back from Washington. A cross-section of August inquiries on small and medium tonnage sheet orders, made to large and small mills alike, found no open capacity prior to February, and that in two mills only. One other mill offered delivery in March, two others in April, one in May and one in June. (These replies were not on the same requirements, although all were on sheet.) These appear to be fairly typical findings of manufacturing companies in the Detroit area at this time.

A FAMILY AFFAIR: The Robinson family at work in the final assembly shop at the Naval Torpedo Station, Keyport, Wash., turning out "tin fish." A son also worked at the station until he entered the service.

Press Association, Inc.

July War Production By Automotive Industry Up 81.4%

Detroit

• • • **July production** within the automotive industry totaled $775,000,000 on war goods, an annual rate of approximately $9,300,000,000, it was reported by the Automotive Council for War Production.

The volume of planes, trucks and other military items turned out in July compared with $747,670,000 in June and $427,150,000 in July, 1942, making the increase during the past year 81.4 per cent.

Here's Help to Avoid Tool Hardening Troubles that Interfere with War Production . . .

Getting hardening results that assure the kind of tools that give longer uninterrupted production is largely a matter of two things. First, having the right steel. Second, having complete heat treating data. And on each of these points, Carpenter is prepared to help you.

The Carpenter Matched Set Method of tool steel selection provides you with a system for selecting the *one* steel that is best for each tool you make.

For help in heat treating the Carpenter Matched Tool Steels, your nearby Carpenter representative will be glad to give you the benefit of his long practical experience. He can render on-the-spot service—keep you in touch with our Metallurgical Department—and supply you with literature packed with helpful information. Here, for example, is basic information on the laws of quenching.

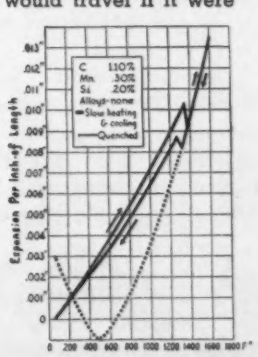
The Four Fundamental Laws of Quenching

LAW NO. 1—Steel is stronger cold than hot. Everyone knows that steel is easier to bend, shape or deform when it is hot. Therefore, when hot steel comes into conflict with cold steel, the cold steel always wins. *(This law explains why a steel rod quenched horizontally will warp upward at the ends.)*

LAW NO. 2—Steel expands when heated and contracts when cooled. This is illustrated by the solid curve in the chart, which shows the behavior of a piece of high carbon tool steel heated and cooled slowly in a furnace. Starting at room temperature, the steel gradually expands up to about 1350°F. when it will be about .010" longer per inch than it was when it started. Here, it reaches the critical point, and while going through the critical, it shrinks somewhat. Above the critical, it continues to expand at a more rapid rate.

On cooling slowly, it shrinks until it reaches about 1310°F., expands while going through the critical and then shrinks back to its original size as room temperature is reached. *(The importance of this law is obvious—since, if different parts of a tool are not cooling at the same rate, stresses will be set up in proportion to the difference in cooling rates.)*

LAW NO. 3—Some tool steels increase in volume when hardened. This is particularly true of water-hardening tool steels. The dotted line in the chart shows the approximate course through which carbon tool steel would travel if it were quenched instead of being cooled slowly. It would continue to shrink (without any critical point interruption) to some temperature in the neighborhood of 500°F. As it cooled below this temperature, it would expand until it would finally be about .003" per inch longer than it was when it started in the annealed condition. *(This law explains why some tools change size in hardening and why some break in the quenching bath. Size change as such is not necessarily disastrous, but if the volume change in part of the tool differs greatly from that in an adjacent part, cracking may result.)*



LAW NO. 4—All steels when stressed under the elastic limit have the same elastic properties—regardless of composition or heat treatment. This may seem impossible, but it is true nevertheless. All steel, regardless of its analysis or heat treatment will stretch exactly .001" per inch under a load of 30,000 lbs. per sq. in. *(This law makes possible the measurement of internal stresses in a piece of quenched tool steel, by simply measuring the amount of distortion. By such a study, it is possible to obtain information to control the quenching operation so as to minimize warpage and breakage.)*

Much helpful information on quenching, like that above, is contained in "Tool Steel Simplified". It is only a small part of the practical information on tool making given in the book. You can put all its useful facts to work in your tool room by making copies available to your tool room men. "Tool Steel Simplified" is available *at cost*, $1.00, in the U. S. A.—$3.50 elsewhere.

THE CARPENTER STEEL COMPANY
139 Bern Street, Reading, Pennsylvania

Carpenter MATCHED TOOL STEELS

Washington . . .

L. W. MOFFETT

• Government has no intention to ruin business in contract terminations . . . Era of cooperation seen . . . Labor gets recognition.

WASHINGTON—Apprehension on the part of many war contract holders that getting out of war production is going to be a lot harder than getting in should diminish as more contractors experience termination.

Certainly, the contract termination regulations which are in effect and the ones under consideration should assure businessmen that the government intends that no contractor shall have his contract cancelled in a manner which will be ruinous.

The new regulations reflect a spirit of trust in business. It is predicted that if administration of these regulations is carried out efficiently, an era of cooperation between business and government will begin.

The Army has announced its policies with respect to contract termination in nine succinct paragraphs in its Procurement Regulation No. 15 of Aug. 14. These principles are:

All work related to the contract, whether performed by the prime contractor or by a subcontractor or supplier is to be stopped promptly except where the contracting officer determines that in the interest of the government, some work in process should be completed. This is to prevent (a) further running up of expenses to the government, and (b) waste of labor and materials.

SO far as is permitted by the terminated contract, property acquired for the performance of the contract is to be disposed of with dispatch, financial advantage, and in a way that makes the property available for productive use as quickly as possible. The regulations give the contractor a choice of selling the property on behalf of the government to another company, or the contractor may purchase himself provided the sale is approved by the contracting officer. The proceeds of the sale are to be set off against the termination charge the government may be liable to pay.

The contractor is to receive fair compensation for the work performed and for the supplies and articles furnished under the terminated contracts consistently with the provisions of the applicable contract article relating to termination.

Amounts owing to contractors, by reason of termination are to be paid promptly and without administrative delay.

Intelligent reviews are to be made of the requests of contractors for payments in connection with termination to verify their accuracy and propriety. These reviews are to be governed by the Termination Accounting Manual with the exception of settlements to be under the termination formula. To avoid delays and because of shortages of accounting personnel, detailed auditing will be reduced to a minimum consistent with the protection of the government's interest.

Full use must be made of the provisions of termination articles relating to part payments, so that all amounts which are clearly due to prime contractors will be paid at the earliest possible moment.

ADVANCE payments and guaranteed loans (which are existing or potential charges against the funds allocated to terminated or curtailed contracts) will be liquidated in an orderly manner. This liquidation should be done in such a way as to protect the contractor's financial structure so far as is reasonably possible. Otherwise the financial interests of the contractor and the financial institution he has employed might be jeopardized. Naturally, the government interest will have to be protected, but the War Department's method of liquidation of such liabilities will be done so that the fewest calls will have to be made by financial institutions upon the War Department to take up guaranteed loans.

PAIR OF ACES: A 13-ton light combat tank being loaded over the side of a transport to a landing barge. Both tank and barge were built by American Car & Foundry Co., N. Y.

Contractors must be pressed to effect prompt, fair and reasonable settlements of their outstanding commitments to subcontractors and suppliers and pass on to them a proper share of partial payments on account of the terminations.

Where contractors are directed to reduce production by partial terminations, equitable adjustments of costs will be made consistently with the applicable contract articles or with an appropriate and equitable supplemental agreement in the event the change causes an increase in the contractor's cost.

The importance of uniform procedures in the termination of contracts by all departments is recognized by the officials who are dealing with the problem. The War Department says that uniformity promotes the prompt settlement of contracts because contractors can set up termination organizations within their companies and operate more efficiently when procedures are uniform.

ALSO, the uniformity of termination regulations guarantees to contractors that they receive the same

MASSIVE LOADS TRAVEL ON *Overhead Railways!*

★ Removing wing section from jig with 5-ton carrier on multiple truck crane.

★ Up and Over handling of massive hull with Overhead Railway System.

THE problem of "up and over" movement of massive loads in the mammoth bomber plants now turning out Flying Fortresses and Liberators was solved by American MonoRail engineers.

So efficient is the operation of these "Overhead Railways" that they have become standard equipment in the Boeing, Consolidated, Martin, Douglas and Ford bomber plants, in fact, wherever 4-motor bombers are built.

Nationally known architects who built these plants recognized early in their plans the advantage of calling upon American MonoRail engineers for highly specialized recommendations. This service is available in connection with war production now or for plant conversion in the future. Early consideration of handling problems often saves valuable time and needless building cost. Call your nearest American MonoRail representative or write us today.

THE AMERICAN MONORAIL CO.

13103 Athens Avenue — Cleveland 7, Ohio

★

treatment. The according of all contractors of the same rights, privileges and duties under termination law is a matter of common justice and sound public relations.

Although there are some differences in policies governing termination the War Department says that every effort has been made to make PR 15 consistent with the regulations of the Navy, Maritime Commission and other contracting agencies.

PR 15 says that the WMC is to be notified by the chief of the applicable technical service whenever production is to be substantially curtailed by terminations. This portion of the regulation came after protests of organized labor that whenever cutbacks or terminations occurred, the WMC and the labor force was not notified of the War Department's intention.

Now the War Department recognizes that non-notification of the proper labor authorities causes impairment of labor's morale and leads to uneven distribution of the manpower.

The subcontractors and suppliers of a contractor whose contract is to be cutback or terminated have to be notified to permit them to make necessary adjustments and to let their working men know what is about to happen.

The part subcontractors are assigned under PR 15 is just as equitable as that played by the contractor. While there is no direct liability between the government and the subcontractor, settlements between the contractor and his subcontractor are considered in computing termination charges. Consequently, the rights of subcontractors are fully protected as those of the prime.

THE authority of the contracting officer to intervene in the affairs of the subcontractor is plenary despite the declaration by PR 15 of no liability between the subcontractor and the government. The contracting officer may require the contractor to submit proposed settlements to subcontractors and the contractor may be prohibited from making larger or smaller settlements than those approved by the contracting officer.

However, PR 15 says that the contracting officer ordinarily should not require that settlements made by subcontractors with second tier and more remote subcontractors be submitted for his prior approval. But the contracting officer may do so, but is not required to scrutinize such agreements in great detail.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THIS IS THE MACHINIST TOOL CATALOG-- NOW HERE'S A MEAT SAW-- NO, HACK SAW-- HAVE YOU BEEN A MACHINIST LONG?
NO, I'M STARTING TOMORROW! WHAT IS THIS, A LATHE? MY HUSBAND SAYS I'LL NEED A CHIP CURLER-- SHOW ME ONE!
A WAR CLERK AND A WAR MACHINIST! IT'S A GOOD THING WE'VE GOT SOME OF TH' BEST FIGHTIN' MEN IN TH' WORLD!
THAT'S WHAT MAKES 'EM SO GOOD-- THEY KNOW WHAT THEY GOT TO MAKE UP FOR-- THEY KNOW ALL TH' JOKES!
J.R.WILLIAMS 9-3
COPR. 1943 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
LOST TIME

Nelson Lauds Youngstown Ingot Production Record

Washington

• • • **Donald M. Nelson**, WPB chairman, sent letters to Frank Purnell, president of the Youngstown Sheet & Tube Co., and Philip Murray, president of the CIO-USW, congratulating them on the company's ingot production of 360,143 tons, in July. The increased tonnage was 11 per cent above July of last year, taking into account capacity additions.

•

Sheet & Tube Sets Records

Youngstown

• • • **The Youngstown Sheet & Tube Co.** set a new record on total ingot production during July, surpassing by 3171 tons a previous record made in May of this year. The new record resulted from additional production of electric furnace ingots at Indiana Harbor works. In the Youngstown district, the company set new production records in July in the rod and wire straighten and cut department and the Brier Hill works combined blast furnaces. The July record at the straighten and cut department was the sixth consecutive monthly record set by the department this year.

Records for 24-hr. production were set by the Campbell works "D" blast furnace and the No. 1 butt weld furnace on ⅜ and 3 in. size.

Murphy Appointed to WPB Under Batcheller

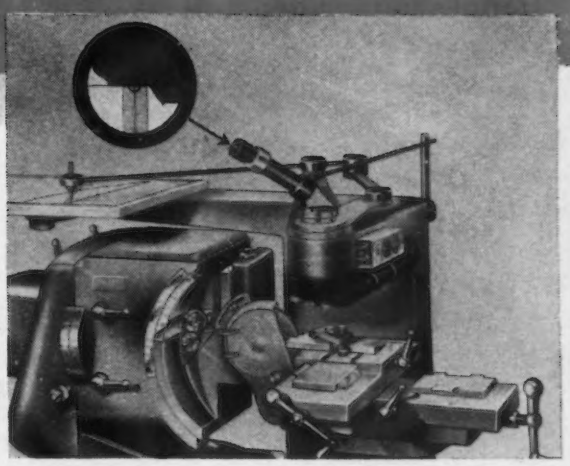
Washington

• • • **William B. Murphy** has been appointed Deputy Vice-Chairman for Production by H. G. Batcheller, WPB Operations Vice-Chairman. Mr. Murphy, executive of the Campbell Soup Co., was formerly chairman of the Industrial Facilities Committee, a post he held since formation of the Committee. His new assignment will involve direction of all production activities within the WPB industry divisions and bureaus which report to the Office of the Operations Vice-Chairman.

Mr. Murphy, a resident of Gladwyne, Pa., came to WPB in January.

The SHEFFIELD MICRO-FORM GRINDER

With Pantograph and Microscope



Operator feeds grinding wheel toward point marked by cross hairs.

Typical flat and circular form tools possible to produce on Micro-Form Grinder.

FINISH GRINDS PROFILES DIRECT FROM DRAWING

No Templates Nor Masters

- Grinds both circular and flat form tools, templates, profile gages, cams, dies, etc. to accuracy of .0003".
- Especially suited for grinding cemented carbides and hardened steel.
- Grinding time, especially on intricate profiles, reduced as much as 50-75% compared to other methods.
- Not limited by regularity nor irregularity of work, nor by straight lines, angles or curves.
- Can be used reversely for making layouts from parts having unknown profiles, and for checking parts against layout drawings.

WRITE FOR FULL DETAILS · BULLETIN M-120-143

ARMY E NAVY

SHEFFIELD MASTER CRAFTSMEN

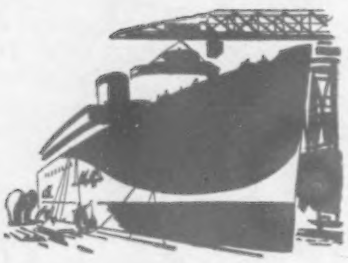
THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS—GAGES—MEASURING INSTRUMENTS—CONTRACT SERVICES

WEST COAST . . . OSGOOD MURDOCK

• Coast industrial centers gain nearly 20 per cent population over 1940 . . . Northwest shipyards ordered to slash payrolls . . . Coast material situation generally good.



SAN FRANCISCO—It won't be news to those newcomers who have searched in vain for a place to live, but new census bureau statistics show that the Pacific Coast is rapidly gaining the missing ingredient needed to make it a first class industrial area—a big consuming population.

Los Angeles is now the third largest metropolitan area in the country. San Francisco, Portland, Seattle and Tacoma have all made population gains of 17.6 per cent or better since the 1940 census.

The new census bureau figures are rule of thumb estimates based on applications for war ration book No. 2.

The Los Angeles metropolitan area now numbers 3,105,503 civilians as of last March 1 to put it ahead of Philadelphia and Detroit. This is a jump of 6.6 per cent since the 1940 census.

The population of the San Francisco Bay area increased more in the last three years than any urban area in the United States with the exception of Washington, D. C., with 254,279 persons more than when the 1940 census was taken. The civilian population of the San Francisco area now stands at 1,701,657, exclusive of service men, who, from sidewalk estimates, comprise a goodly chunk of the population of this important military center. The same goes for San Diego, which is undoubtedly the most tightly packed town in the country today. San Diego gained 103,640 civilian residents since 1940, a 37.5 per cent gain.

In the Pacific Northwest, where city figures are also bulging considerably, Portland made a 19.2 per cent gain, Seattle a 20.5 per cent gain, and Tacoma an 18.4 per cent gain. Civilian population of Portland is up 79,281, Seattle, 102,955 and Tacoma, 31,915.

One of the soundest observations in all the talk of increased steel capacity for the West Coast was made a few months ago by Benjamin Fairless of the Steel Corporation when someone asked him why the corporation had not increased its open hearth capacity here. He popped back immediately "You can't build steel plants until you have markets." The logic of those simple words has been consistently overlooked by many sound scientific minds appraising the natural resources of this part of the country.

It may not be enough to justify another big steel plant, but the new population figures show exactly how rapidly a market is growing out here.

ASSIMILATION of the big increase in population, along with the military and camp followers, has by no means been completed, and there are still ugly undertones that indicate distribution of the workers has not been in accord with production needs. For instance, A. F. Hardy, director of the War Manpower Commission for the State of Washington, estimates that shipyards in the Puget Sound area are overmanned by 16,000 workers. This tends to confirm a rumor which has been popular concerning shipyards all along the Coast ever since they began to make mass additions to their payrolls. So far, there have been scant conclusive data other than an apparently well-formed habit of the Maritime Commission that it is better to have too much of everything on hand in case it should be needed, rather than to share men and materials with other agencies participating in the war effort. Similar tendencies of the armed services along these lines is well known. This policy now is beginning to bite the hand that feeds it, for the Army is even now hard up against it to secure 9000 workers needed to man the Boeing plant at Seattle, in the same area where WMC states there are 16,000 workers too many in the shipyards. Now that direct military production is beginning to suffer, the services may look more closely into reports of labor hoarding, which apparently they have encouraged by some of their contractors.

PROPAGANDA SHELLS: Pvt. G. Harper, left, of Aberdeen, Scotland, loads propaganda leaflets into nonlethal shells as Sgt. J. Jarvis, of Paddington, England, unpacks the rolls of printed propaganda. These were used during the invasion of Sicily.

HARDY'S assertion, made a fortnight ago, was the tip-off on findings of an investigation conducted under the joint auspices of the Navy, the WMC and the War Production Board. Last week, the WMC and WPB were joined by the Maritime Commission in announcing that the survey had disclosed that Puget Sound shipyards could drop from 15,000 to 18,000 men without impairing production. The shipyards were ordered to make overall payroll reductions of 10 per cent, with some yards ordered to turn loose 20 per cent of their workers. WPB, although it is not directly charged with solving manpower problems, can be credited with conducting initial surveys several months ago which indicated the yards were overmanned and with spurring on the other agencies to take direct action.

That junket reported in these pages

Reapers of The Sea

Never before has so much depended on professional fishermen. Today they must supply, in greater quantities than ever, fish for food . . . for valuable vitamin oils . . . for meal to make feed and fertilizer. The task confronting the fishing industry calls for mechanical equipment that can take punishment without flinching.

Widespread use of Twin Disc Marine Gears to apply and control propelling power on present-day fishing and work boats is additional evidence of the extent to which Twin Disc Clutch Company's twenty-five years of specialization in the design and manufacture of power links has contributed to the basic human activities which make life better, easier, for everyone.

Marine gears of highest reliability and stamina are but part of the Twin Disc line, which includes friction clutches and hydraulic drives for nearly every industrial application, as well as the new hydraulic torque converters which have already revolutionized engineering thought in many kinds of work. Whenever *you* are ready to talk power links for equipment you build—either now or in the future—talk with Twin Disc engineers. You'll get the finest counsel and help available, and you'll probably get more for your money when you buy. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin.

TWIN Disc Marine Gears provide full forward speed in reverse . . . an invaluable factor to fishermen in handling nets and lines and in maneuvering their craft in dangerous waters and crowded ports.

last week by top WPB, War and Navy Department officials to have a first hand look at the West Coast production problem may have brought to a head the whole question of manpower utilization and resulted in the order to make a blanket cut in payrolls. The fact that positive action on the manpower problem has been delayed until now is a specific example of the type of procrastination which could be avoided if power to act were taken away from officials sitting in the nation's capital and handed to men on the scene who are actually familiar with conditions. Occasional junkets by top flight brass hats from Washington, D. C. invariably result in action that every local yardbird has known to be necessary for months. Yet there continues to be a prevalent belief in Washington, D. C. that no one but a single-notioned executive looking through a 3000-mile telescope is competent to judge actual conditions on the Pacific Coast. This concentration of detailed administrative authority has done more than any other single administrative factor to keep Coast production in shackles.

ANY analysis as to whether the shipyards actually are overmanned is closely tied in with availability of material. For some time, the correct appraisal may have been that there would not have been too much labor had sufficient material been available at the right time—at least that is the answer usually given by those accused of labor hoarding. Even now, it is apparent that much more efficient utilization of labor could be made were the material situation always controllable.

Insofar as steel is concerned, the supply situation appears to be definitely over the hump in most sections. One of the principal Puget Sound shipyards reports no material shortage whatsoever. Pacific Car & Foundry Co., completing a tank contract, states that materials have been flowing in regularly, with no stoppages or delays. Significantly, this company has balanced its labor budget also. The steel scrap supply continues satisfactory, but with emphasis on the lower grades, in the Pacific Northwest.

The steel warehouses all up and down the Coast, which six months ago were bare as ballrooms on Sunday morning, now appear to be well fixed for stock. Earle M. Jorgensen Co., one of the principal warehouses in the San Francisco and Los Angeles areas carries a full page advertisement in the current issue of a purchasing agents' publication blaring the news that "stocks are now in much better shape than at any time during the past year." Nothing like that has been seen for some time!

A NEW aircraft plant to be manned entirely by several hundred American Chinese will be constructed in southern California to produce subassemblies for Douglas A-20's. The new plant will be operated, following organization help by Douglas, as China Aircraft Inc. Chinese Air Force officers and representatives of the material command cooked up the idea at recent conferences.

DeLong Appointed As Vice President of Columbia

Los Angeles

• • • **F. B. DeLong has been** appointed vice-president and general manager of sales of the Columbia Steel Co. succeeding J. R. Gregory, recently named to same office with new Geneva Steel Co. DeLong joined Columbia at Los Angeles in 1937 as manager tubular alloy and stainless department.

West Coast Loses Fast Freight Service By ODT Order

Washington

• • • **The operation of special** expedited freight trains which take precedence over regular traffic was ordered stopped by the Interstate Commerce Commission at the request of the ODT, effective Aug. 27.

ODT officials explained that recently some railroads, particularly those serving the West Coast, have been running expedited freight trains which are operated on virtually passenger train schedules. These trains, which carry war materials, are operated under tariffs which call for an extra premium payment for the faster service.

The operation of these fast freight trains, the ODT pointed out, tends to cause congestion in the terminals and slows down all freight. Moreover, such an operating practice calls for an increased use of motive power and men at a time when most railroads are short of both, the ODT declared.

. . . Cited for Awards . . .

• • • **The following companies** have been awarded the Army-Navy "E" for outstanding performance in war production:

P. R. Mallory & Co., Inc., Indianapolis (third star).

•

Handy & Harman, Bridgeport, Conn. (second star).

•

United States Spring & Bumper Co., Los Angeles.

•

The Bristol Co., Waterbury, Conn.

•

General Machinery Co., Spokane, Wash.

•

Gates Rubber Co., Denver.

•

Carborundum Co., Niagara Falls, N. Y.

•

Union Wire Rope Corp., Kansas City (third star).

•

Aro Equipment Corp., Cleveland.

•

Avondale Mills, Sylacauga, Ala.

•

Barlow & Seelig Mfg. Co., Ripon, Wis.

E. J. Branch & Sons, Chicago.

•

Chicago Telephone Supply Co., Elkhart Plant, Ind.

•

Coast Centerless Grinding Co., Los Angeles.

•

Ferro Machine & Foundry Co., Cleveland.

•

Norman Ford Co., Tyler, Texas.

•

Great Lakes Spring Corp., Chicago.

•

Infilco, Inc., West 25th Place Plant, Chicago.

•

Le Roi Co., West Allis Plant, Wis.

•

Micro Switch Corp., Freeport, Ill.

•

Nash-Kelvinator Corp., Propeller Division, Lansing, Mich.

•

National Union Radio Corp., McCarter Highway Plant, Newark, N. J.

•

The Pfaudler Co., Elyria Plant, Ohio.

Maritime "M" Award

R. D. Cole Mfg. Co., Newnan, Ga.

•

Moore Dry Dock Co., Oakland, Cal.

VICKERS HYDROMOTIVE CONTROLS Help Conserve Cutting Tools

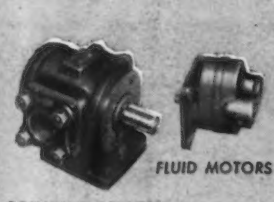
Tool breakage and excessive tool wear is costly and annoying at any time . . . but it is extremely serious in war time. This wastage of tools has assumed such proportions that the War Production Board has launched a program of tool conservation.

Longer tool life and greater tool efficiency can be designed into many machines simply by equipping them with Vickers Hydromotive Controls. With Vickers equipment you can provide the exactly correct speeds and feeds for each tool and job. Feed rates are infinitely variable; exceptionally accurate adjustment is possible by simply turning a dial; set feeds and speeds are maintained regardless of variations in work resistance; adjustments can be made during cycle. While cutting, the tool is always protected against abuse due to overload by automatic hydraulic pressure limitation. Any desired control sequence can be set up and made as automatic as expedient. Controls can be interlocked so that it is impossible to do the job wrong—impossible to jam and break tools. Exact load limitations can be applied so the machine cannot be overloaded.

Vickers Application Engineers are available to discuss the many opportunities for improved machine controls.

VICKERS *Incorporated* · **1420 OAKMAN BLVD.** · **DETROIT 32, MICHIGAN**

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • ROCKFORD • TULSA • WORCESTER



Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

Fatigue Cracks . . . BY A. H. DIX

Yerden, Stay 'Way From Our Door

• • • Alfred Yerden, alias "A. Moore," the Midwestern Robin Hood, is again on the prowl. Last February he was sentenced to a three months' anneal in the Detroit House of Correction, in recognition of his success in victimizing manufacturers of metal products out of sums ranging from $10 to $37, paid him in the belief that they were subscribing for your favorite family journal.

Hoping that the anneal had removed his anti-social stresses, we published this pious observation on the day of his release, May 13, "Perhaps he has resolved to tread the dull path of righteousness." But suspecting that he would find a strange trail frightening, we added:

> Again it may be that he has already thought up a virgin, unsullied alias and may soon pass among you with new, grander, but still phony receipt forms.

Our dismal second guess proved to be right. The old receipt form, bearing the name of the fictitious Publishers' Service Bureau, 428 Fifth Ave., New York, has been abandoned. In its place is a brand new one, bearing a Chicago address. Everything is changed but the street number—428, which apparently Yerden regards as his lucky number.

Since his release, Yerden seems to have been avoiding the metal products industry, the scene of his downfall. People in fields apart from ours are being dazzled by his deskside manner. But he may return, so we suggest that you memorize his profile, noting particularly the power-dive angle of his ears.

Yerden is 5 ft. 10 in., 155 lb., polite, suave and persuasive—even hypnotic. The other day he called on a merchant who held in his hand a bill for a subscription for a certain trade journal—one year, one dollar. Yerden, who is not the loud-mouthed, desk-banging type, leaned forward and said confidentially, "I'll tell you what I'll do. I'll make you a special offer—five years for $10." He got the $10.

Pessimist

• • • Ingo Maddaus marks a triple exclamation point —!!!—on a postcard sent out by a machinery dealer who headlines his offerings:

> PUT THESE TO WORK, THEY WON'T LAST LONG

He Sees Red

• • • Apoplectic is what a Printers' Ink contributor is over the fact that the winning entry in a "What-are-we-fighting-for?" contest conducted by a marine base publication was:

> "The aroma of mom's cooking—the sandlot baseball and football . . ."

The objector says this indicates that there exists among our fighting men an alarming state of ignorance of our larger war aims. The contention is, it seems to us, more alarming than the evidence warrants. The prize-winning contribution may merely reflect an entirely understandable nostalgia on the part of the judges, as well as an appreciation by the editors that a camp newspaper, which is designed mainly to entertain, is no place for a serious discussion of war objectives.

Perhaps the camp newspaper should not have started the contest in the first place, leaving the weightier topics to the more cerebral military publications, like the *Stars and Stripes* and *Yank*. But having begun it, the newspaper did not compound the error by leading its readers into a debate that could not honestly have ended without a consideration of the implications of the Welles resignation. And this at a time when the readers should be devoting all their energies to learning a new trade.

Having reduced the P. I. contributor's case to a fine hash, we will go on with a gripe of our own. It concerns advertisements of the type headed, "We're Fighting for the Right to Boo the Dodgers." This, we believe, is exactly what we are not fighting for. What we are fighting for is a continuation of the right to boo the government, if and when we are so disposed.

The right to boo a sports event is a cheap privilege, and rather than being denied by dictators, it is actually encouraged, the idea being that if you provide enough things of small account for a man to boo, you may keep his mind off the loss of a great right. In Jersey City, for example, it is at least still legal to utter sounds indicating contempt for the local baseball team which has a deathlike clutch on the International League's cellar position.

Clerk Revealed

• • • Two weeks ago we said we were puzzled over occasional indications that "clerk" is a corporate title of rather high estate. An anonym who signs himself "New Englander" explains:

> Massachusetts is one state whose corporations do not have secretaries but clerks. The clerk of a corporation there performs the duties of a secretary, and in fact frequently signs himself "Clerk with statutory powers of Secretary."
>
> We hope this will relieve your mind.

It does and we are grateful. We have yet to find a limit to the knowledge of this page's loyal army of 18 readers.

Aptronym

• • • We reported recently that the name of the Chicago *Sheep Breeder's* editor is Perry Ewing, adding that *to ewe* is to have a lamb. W. S. (Virginia Bridge Co.) Miles objected, declaring that having a lamb is not *ewing* but lambing. We retorted that our dictionary gives *ewe* as a verb as well as a noun. He answers:

> *Who would take old Webster's word*
> *For what goes on in a shepherd's herd?*
> *Ask the ewe or ask the ram*
> *Did she ewe or did she lamb?*
>
> *Folks like me are caught unwary*
> *By quoting from the dictionary*
> *But who so does a job so neat*
> *Should not leave off the "obsolete."*

The use of *ewe* as a verb is marked "obs." in our dictionary, and we ask forgiveness for failing to so state. To ewe is human. Which reminds us to report that Tom Ryan sends in a clipping from the vital statistics column of a St. Louis paper, announcing that a baby girl has just been born to Mr. and Mrs. E. Lambing of 2400 McNair St.

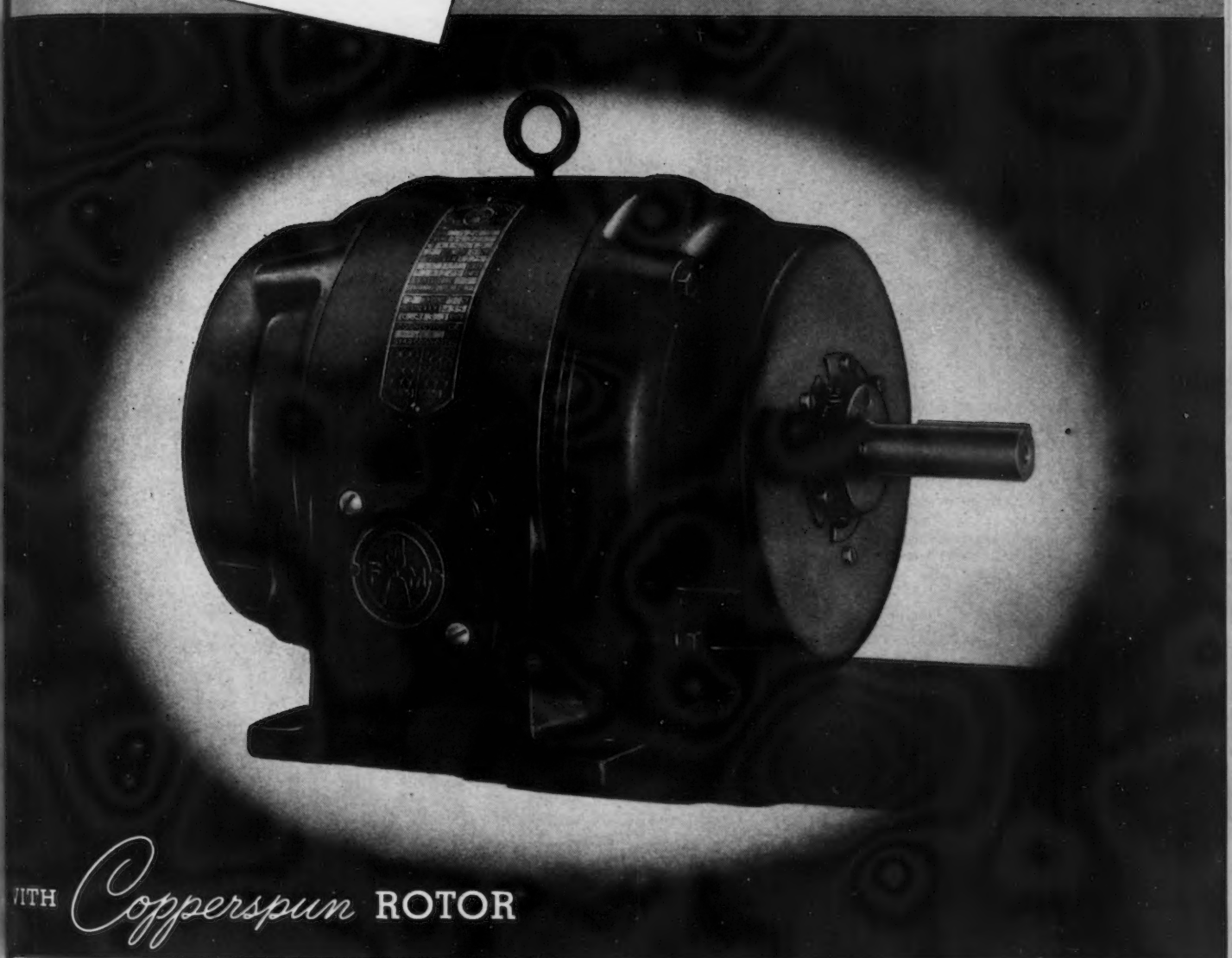
Puzzles

• • • Last week's missing digits are 124) 12128316 (97809.

R. F. (Burrard Dry Dock Co., Ltd.) Driscoll reintroduces us to an old friend, the ladder problem. We have never seen it tried with 30 ft. and 40 ft. ladders, so here goes:

Two ladders are mounted in an alley between two buildings. A 40-ft. ladder has its foot against one building and leans across the alley, its top resting against the opposite building. A 30-ft. ladder is placed vice versa. The ladders cross at a point 10 ft. above the ground. How wide is the alley?

NEW FAIRBANKS-MORSE MOTOR



WITH *Copperspun* ROTOR

Here is a motor — different from any you have ever seen.

It is a challenge to future motor design — because it includes more versatility, more stamina, more protection than was ever put into one housing before.

• It is a 40°C motor — with a ventilating system you will want to know about! • It is a protected-type motor! • It has the most adaptable, convenient, and handiest conduit box you ever laid your eyes on! • It has the famous Fairbanks-Morse COPPERSPUN Rotor!

A demonstration is necessary to fully appreciate the many unique features of this motor. You will want to know all about this new Fairbanks-Morse Motor — especially if you are now buying motors for a war task but want them to be up to the minute when the time comes for post-war production.

Write Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago, Ill., for full information.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Motors

Dear Editor:

ELECTRO-PLATING GLASS

Sir:

Please give us the name of the manufacturer who can electro-plate glass, as shown in your Aug. 12 *News Front*.

LOGAN EISELE
Eisele & Company,
Nashville, Tenn.

● Precision Paper Tube Co., 2023 W. Charleston St., Chicago, 47.—Ed.

NORMALIZING BY ABRASION

Sir:

We understand that there is a certain process by abrasion whereby iron castings can be normalized. We manufacture surface plates, straight edges, and other cast iron items and are very much interested in this, if this is the case.

L. L. STEWART
Stewart Company,
516 Asylum Street,
Hartford, Conn.

● You may have in mind a process now being widely investigated in the aircraft industry. The fatigue strength of certain parts is increased by a shot blasting or peening process. The object of this is to pre-stress the surface layer of the metal in compression so as to offset tension forces that develop during normal load conditions. All fatigue failures start from minute cracks which are opened up under tensile strength. See "Improving Fatigue Strength of Machine parts," page 65, June 10 Iron Age.—Ed.

BLAXOL

Sir:

Kindly inform us where we can obtain a plating formula called Blaxol. It is used to make gun metal on steel.

HARRY SEGALL
Lynn Buckle Mfg. Co.,
721-735 Washington Street,
Lynn, Mass.

● Blaxol is new to us.—Ed.

POWDER METALLURGY

Sir:

We would highly appreciate the listings of any publications available covering all phases of powder metallurgy.

W. R. ELLIS
Logansport Machine, Inc.,
Logansport, Ind.

● No periodical deals exclusively with powder metallurgy. The Iron Age has had many articles on the subject, as have other technical journals. The best correlation of all available material appeared in "Review of Powder Metallurgy Literature," issued by the Colorado School of Mines Quarterly, Vol. 36, No. 4, Golden, Colorado. See also "Principles of Powder Metallurgy," Longmans, Green & Co., 55 Fifth Ave., New York.—Ed.

GOVERNMENT JOBS

Sir:

Mr. Van Deventer's Aug. 19 editorial, "Want a Government Job After the War?" was enjoyed and appreciated very much by me. It is gratifying to know that we have red-blooded men who can sit down and write an article of this character.

My best wishes to you and best wishes that Mr. Van Deventer will be inspired to write more editorials of this kind.

E. B. CORBETT
Corbett-Wallace Corp.,
P. O. Box 42,
Houston, Texas

FERROSILICON

Sir:

I am anxious to get some data on ferrosilicon. What I want is how it is made and what are the elements that go into it.

JOHN J. SULLIVAN, Pres.
St. Lawrence Quarries,
Gouverneur, N. Y.

● Ferrosilicon is a product of the electric furnace and is made from quartz or silica, iron turnings and carbon.

The exact technique for making it varies among the few plants producing it and they have usually kept their practices a secret.—Ed.

REINFORCING STEEL

Sir:

What is the normal annual consumption of reinforcing steel in this country? What was it in '42? How much was used for bridges, and how much for buildings?

G. F.
Chicago

● In 1940 a "normal" year, the consumption was 1,425,998 net tons. In 1942 it was 1,829,760. Of the latter figure 1,322,272 net tons was used for all construction, but how much for bridges and how much for buildings we do not know.—Ed.

STEEL IDENTIFICATION

Sir:

Is there a standard code of colors used in marking the many grades of steel? These colors are used for quick identification in the stock pile.

J. B. PINCKNEY
Sulflo, Inc.,
1143-45 E. Jersey Street,
Elizabeth, N. J.

● About the best is the large color chart supplied by the Navy Dept., Bureau of Supplies and Accounts, Washington, D. C. If you write direct we believe you will be able to get one gratis.—Ed.

CUPOLA LOSS

Sir:

How much iron must be put in the cupola to make a 1000-lb. casting? In other words, what is the loss in melting 1000 lb. of pig iron?

C. M. SELBY
Holland Furnace Co.,
Holland, Mich.

● The cupola is an extremely efficient melting instrument, and using an all-pig iron charge your overall metal yield should be 98-plus per cent. If considerable steel scrap were used with the pig iron, the cupola yield would be close to 100 per cent, as the metal picks up silicon and carbon in quantities sufficient to balance oxidization loss.—Ed.

SELAS

Sir:

What is the address of the Selas Co., referred to in *News Front* of Aug. 5?

GEORGE B. STEELE
Northern Utilities Co.,
Casper, Wyoming

● Erie Avenue and D St., Philadelphia.—Ed.

DIRECTORY OF TOOL STEELS

Sir:

Will you please send us ten copies of the Directory of Tool Steels, at 25c. each.

L. G. WHEELER
Grumman Aircraft Engineering Corp.,
Plant No. 3,
Bethpage, Long Island, N. Y.

● No copies are left, but a new, revised edition will be ready shortly.—Ed.

DIE CASTINGS

Sir:

Kindly advise us if possible of any trade magazine published for the benefit of the die casting industry.

J. R. DAILEY
Turner Manufacturing Company,
Kokomo, Ind.

● There is no exclusive die casting periodical. Die casting developments are reported in The Iron Age and its contemporaries.—Ed.

CYCLEWELD

Sir:

Can you tell us anything about the Clyde-Weld process of joining metals?

H. H. GODFREY
Dobbins Manufacturing Co.,
Elkhart, Ind.

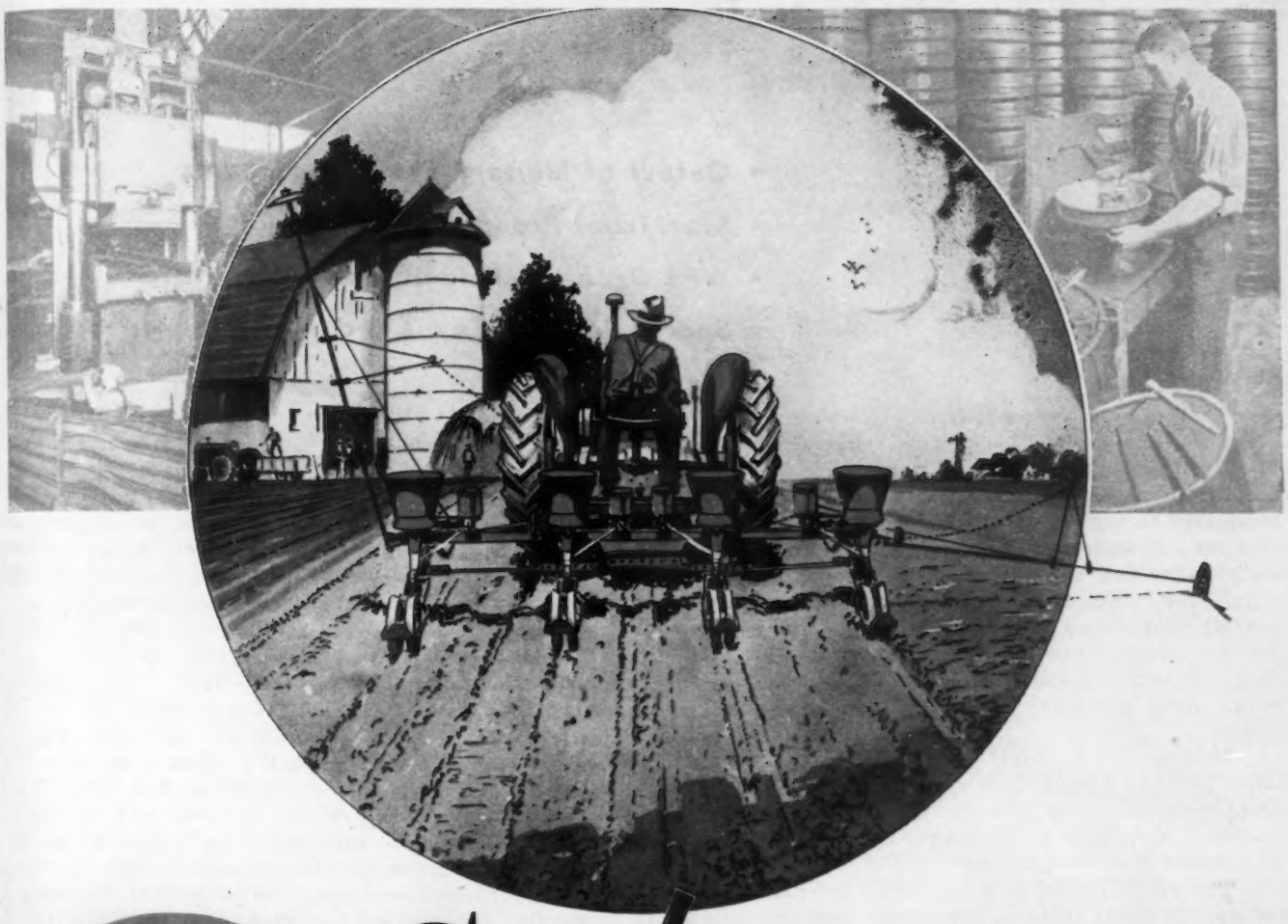
● No doubt you have in mind the Cycleweld process, a joint development of Goodyear Tire & Rubber Co., Akron, Ohio, and Chrysler Corp., Detroit. The process employs a curing cycle, involving the use of heat and pressure, necessitating the use of special equipment. It is now being used in military applications and information concerning it is limited.—Ed.

TUBE BENDING

Some time ago I read an article in your magazine describing the bending of pipe and tubing. I believe it had to do with one of the airplane companies. In what issue did it appear?

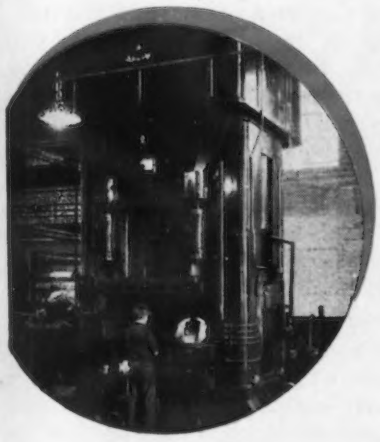
DONALD R. STEELE,
Metallurgist
Progressive Foundry Works, Inc.,
10 Mount Read Blvd.,
Rochester, N. Y.

● The article about the Douglas tube bender that has increased output ten times is on page 54 of the June 17 Iron Age.—Ed.



Seeding Time

● Post-war crops of civilian products are being planned now. Wartime experience is being applied to new materials and methods of working them, to new designs and to new engineering. Where lightness, strength and shock resistance enter your plans, Transue's years of experience in deep-drawn steel stampings and stamping methods may be of assistance.



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This Industrial Week . . .

- **Output of Military Equipment Spurts**
- **Steel Ingot Production Rises Again**
- **WPB Orders Rolling of More Steel Plates**
- **Sparks Between Lewis and WLB Create Fear**

NEW distress clouds may be forming on the horizon, but production of raw materials and military equipment continues at a very high level despite all present problems. Steel ingot production is up one half point this week to a national rate of 99.5 per cent and munitions output has soared surprisingly in the face of the critical manpower problem.

Nevertheless, the showdown which appears to be nearing on the coal mine labor front and the possibility that the wartime steel distribution system before long may require tuning again are among the shadows which some observers believe worthy of closest attention.

Because of the sparks which have been created lately between John L. Lewis and the government, apprehension is greater over the possibility of new outlaw work stoppages at the mines prior to the Lewis-established Oct. 31. deadline.

The ever tightening situation in steel caused by constantly rising demand for plates has been accentuated by new Maritime Commission orders, which in the case of at least one mill are so great that no other consumers can be served. Meanwhile, several other important programs requiring flat rolled steel are being pushed—an extensive program for "blitz" containers; another for landing mats; a third for Navy pontoons, and still another for bulldozers and other rehabilitation equipment. Mill schedules have been filling up rapidly into 1944.

TO meet increased demand for plates brought on by the stepped up Maritime program for 1943, WPB will direct the rolling of 50,000 more tons of plates a month in the fourth quarter than were rolled in the previous three months. In third quarter, the Steel Division estimates that 3,217,000 tons of plate will be produced. The new directive will result in the rolling of about 3,420 000 tons of plate in the fourth quarter. As expected now, Maritime will receive fourth quarter allotments as follows: October, 543,000 tons; November and December, 550,000 tons each. During the third quarter Maritime was allotted 500,000 tons a month.

Steel Division officials contend that 95 per cent of delivery promises are being met by steel mills under CMP. Regardless of the accuracy of this figure, a majority of steel users and producers holds to the firm belief that steel distribution as now controlled by the government is far more efficient than at any time since the war began. However, it is agreed that there still are many minor adjustments which are deemed desirable. Not all the allotments issued to steel users can be "cashed" for steel in the form desired with delivery when desired, for while directives and ingot tons are lined up fairly accurately, inconsistencies are apparent farther down the line. Finishing capacity as related to directives is below requirements for certain kinds and sizes of steel. This is one reason why steel executives contend little if any additional steel can be provided for the manufacture of civilian end products other than the most urgent.

SEEMINGLY, an unrelenting drive upon inventories is necessary, with frequent audits of allotments and unfilled order books, plus constant efforts to adjust programs to actualities. The action of WPB in taking over the job of filling holes in mill schedules caused by cancellations has taken away what little flexibility of operation remained with the mills and gives the war agency practically complete control over the operation of steel mills.

The WPB preliminary estimate for July munitions production reveals an overall increase of three per cent over June. July output fell short of its goal but it was the first month since April that production came within striking distance of the average monthly gains maintained early in the year. Apparently, manpower shortages prevented a wider gain in July. For example, the magnesium production problem appears to be solved but use of fabricating facilities must be discounted by as much as 25 per cent in some instances due to labor shortages. In Canada, the lack of manpower has forced a 10 per cent reduction of nickel output in recent weeks, has brought about a decline in shipments of copper concentrates to the United States and is affecting other base metal mining operations.

LACK of both coke and coal stocks in the steel industry still remains a threat to production not likely to be overcome even through an enforced 8-hr. mine day. Latest figures on coal production costs covering only the first quarter of the year show an increased cost of about 8c. per ton but do not reflect the overtime pay now in effect. The diversion

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Sidelights of This Week's Summary

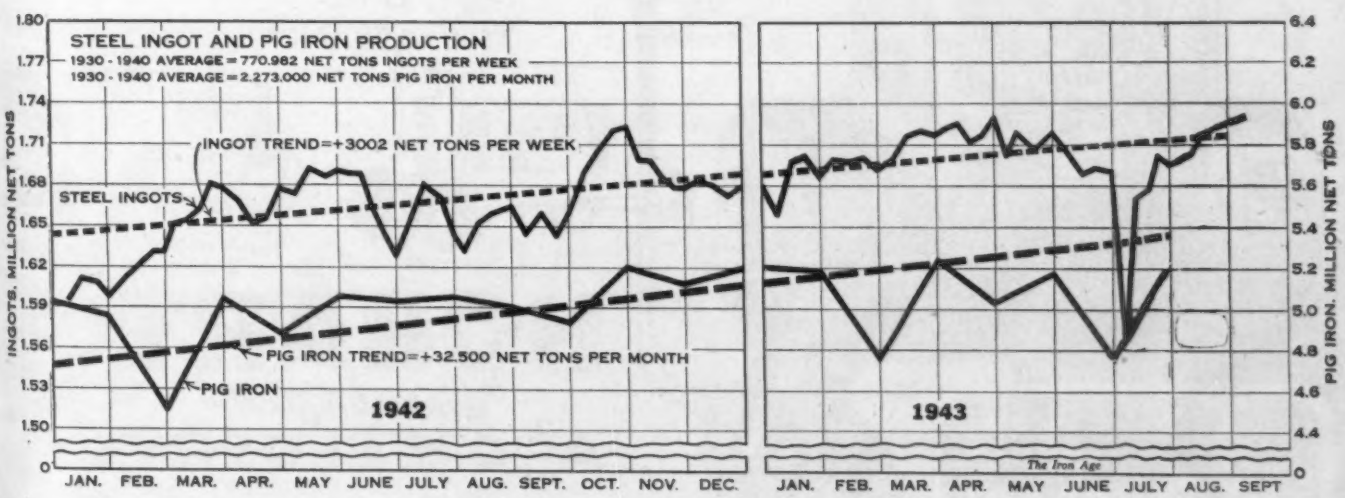
● ● ● Lend-Lease steel is starting to back up again in this country, according to a usually reliable source, who believes changed war needs may be the reason . . . The Army recently turned back a substantial tonnage of barbed wire for essential civilian channels and pipe which has been lying around for a long time awaiting shipment has been sent back to mills for reconditioning . . . WPB's Steel Division is pressing for the receipt of firm rated orders before Oct. 1 for the new 1200-mile natural gas pipeline which will aid industries in Pennsylvania, Ohio and West Virginia, and which will require 215,000 tons of steel . . . Electronic equipment requirements in the war program are mounting steadily, calling for a steep increase in production. No plateau is in sight . . . In Michigan there are expectations that the air force may relax somewhat its engine spare parts policy, which calls for ordering spare parts to the extent of 38 per cent of dollar volume of completed engines. The more settled nature of depots and bases today, along with the flowing of military operations on better fixed lines, is diminishing parts needs a bit. Industry belief is that the 38 per cent requirement may be cut to around 25 per cent, helping relieve alloy steel and aluminum requirements . . . Recoveries and price reductions by government agencies from renegotiating contracts in cooperation with private industry totaled $3,955,850,000 as of July 31, of which the Army portion was $2,743,500,000, it was announced by the War Department, whose price adjustment boards on Sept. 1 was set up as a staff division of the Army Service Forces known as the renegotiation division.

of coking coal over long distances to some steel companies is costing considerably more, to those companies, than if they obtained it from their old sources. Many of the old sources are wiped out due to the exhaustion of coking coal veins. Good beehive coke is hard to get. Pig iron production is suffering to some extent because some steel makers are so badly in need of coke that they are forced to use inferior grades.

Jobbers and warehouses are viewing M-21-b-2 with mixed feelings. The order goes into effect the first of October. Previously MRO orders were sold from stock and many warehouses were selling themselves out of business. The new regulation allows for replacement of these products sold. Orders sold on CMP directives could be replaced and in addition the warehouse could get 40 per cent of what was bought last year. Now, whatever is sold is replaced without the extra 40 per cent.

HELPING to account for the gain of half a point this week in the national ingot rate, bringing it to 99.5 per cent of capacity, was a gain in the Pittsburgh operating rate of one point which lifted output there to 101.5 per cent. Cleveland operations increased two points to 100 per cent. Production in Wheeling has been upped four and a half points to 99.5 per cent and Birmingham at 102 per cent has gained three and a half points. The Detroit district has been operating this week at 103.5 per cent, five and a half points higher than last week. Youngstown has fallen off one point to 96 per cent and Cincinnati at 103 per cent has decreased two points. The Eastern district at 99.5 per cent has dropped half a point. Continuing at the same rate are Chicago at 99.5 per cent, Philadelphia at 93.5 and St. Louis down 12.5 to 86.5 because of a strike in an open hearth department.

The Iron Age


STEEL INGOT AND PIG IRON PRODUCTION
1930 - 1940 AVERAGE = 770,982 NET TONS INGOTS PER WEEK
1930 - 1940 AVERAGE = 2,273,000 NET TONS PIG IRON PER MONTH
INGOT TREND = +3002 NET TONS PER WEEK
STEEL INGOTS
PIG IRON TREND = +32,500 NET TONS PER MONTH
PIG IRON
INGOTS, MILLION NET TONS
PIG IRON, MILLION NET TONS
1942
1943
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT
The Iron Age

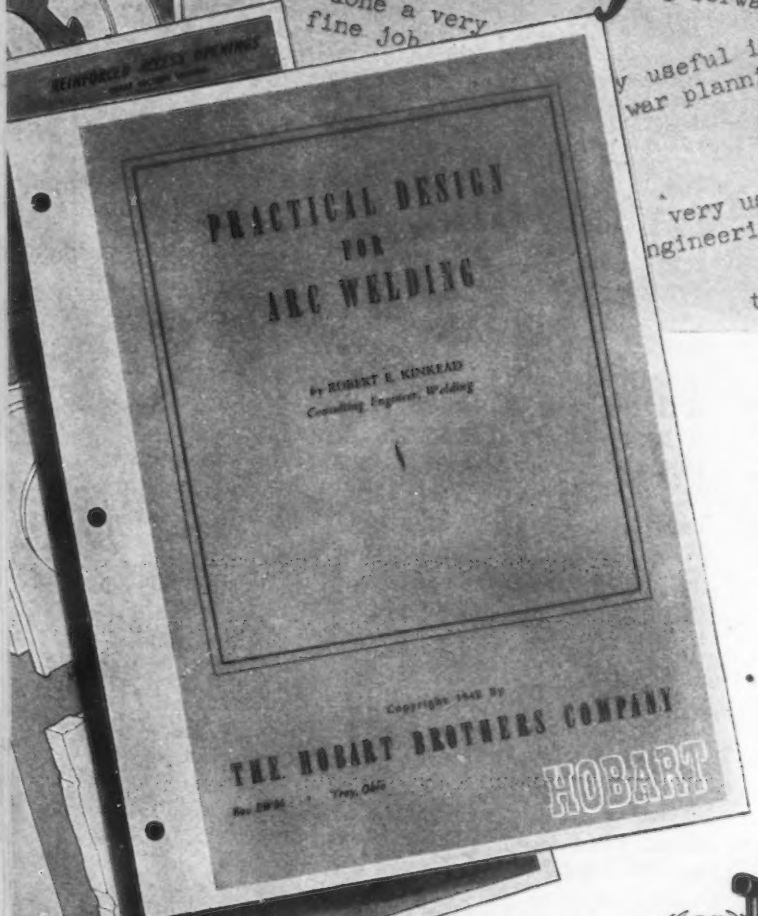
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	S.Ohio River	St. Louis	East	Aggregate
August 26	100.5	99.5	97.0	93.5	98.0	104.5	95.0*	98.5	97.0	102.0	105.0	99.0	100.0	99.0
September 2	101.5	99.5	96.0	93.5	100.0	104.5	99.5	102.0	103.5	102.0	103.0	86.5	99.5	99.5

* Revised

Manufacturers say...

"It's Great!"



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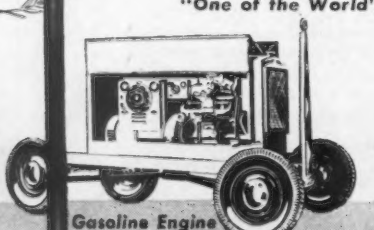
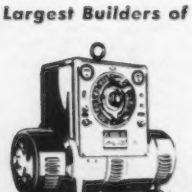


Gasoline Engine Drive Welder



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Please send initial mailings of "Practical Design for Arc Welding" FREE. Am also interested in items checked:

☐ Hobart Manual ☐ Arc Welding Manual, $2.00 postpaid

NAME _____

ADDRESS _____

LABOR: Continued Difficulties Seen Ahead; Mine Troubles Look Certain; Action Indicated

LEWIS THUMBS REPORT: While William H. Davis, WLB chairman, left, conferred with Thomas Kennedy, UMW secretary-treasurer, during a lull in the WLB's hearing of the anthracite wage increase, John L. Lewis checks the anthracite argument.

New York

• • • A digest of current labor activities indicates that the government is not yet through with labor troubles and may be forced to amend or revise the Smith - Connally anti-strike bill in the near future. The government is also seen in line to receive more coal mine trouble through strikes — a subject of real worry to steel producers, coke plants, railroads and utilities right now.

The deadline for possible concerted coal strife is Oct. 31—John L. Lewis' deadline to the government predicated on the government retaining control of the mines. However, some trouble is already occurring and is expected to grow as the government continues to return mines to their original operators.

The big fault in the Smith-Connally bill became evident through the strike at the Johnsville plant of Brewster Aeronautical Corp. where the men after striking in protest to the arrest of four allegedly disobedient plant guards went back to work in respect of the 30 day cooling-off period called for in the anti-strike bill. At the end of this period the men have the right to hold a strike vote and actually call a strike if conciliation has not changed the setup.

The joker is that, by implication, the government has to all appearances sanctioned the strike when it occurs under these circumstances. It should be remembered that this phase of the Smith-Connally bill was the one to which the President objected and which was fundamentally responsible for his veto. It is this section (8) of the bill which is expected to be altered in forthcoming legislation.

One small-fry instance of this kind is already on the dockets in the case of the Jamestown Metal Equipment Co. Employees there have already waited the prescribed 30 days and have voted to strike.

Observers close to the coal mine picture foresee early and lasting trouble with the miners. Most believe that it will not be a concerted national movement but a day-to-day wildcat work impediment without blessing of the UMW or John L. Lewis.

By members striking without union approval the union accomplishes the same end without risking the further sanctions of WLB which were promised by the President's order such as dues holding and removal of union privileges. The individual involved in strike fomenting is of course eligible for drafting under the order but due to the shortage of miners this is not expected to be invoked.

As a matter of fact, the migration of miners to war plants has already been a matter of serious concern to Washington ever since the first coal strike. Miners, lured by the higher wages and better working conditions offered in the prime war plants have been leaving their trade and a permanent mark is said to have been left on mine manpower already. Selective Service has also taken its toll in miners — a mistake which Britain made early in the war and from which America seems to have drawn no lesson.

Fear of drafting has not influenced the miners unduly as they seem to well know that the government sees greater need for them in the mines than in the armed forces.

The WLB refusal to grant portal - to - portal pay to the Illinois operators has already resulted in the striking of several mines. Two major mines in Ohio have walked out closely followed by two more in Alabama. These strikes in themselves are not important except that they show the temper of the miners and mirror things to come.

Strikes in steel have not ceased to exist either. A time study grievance caused the strike of 1600 workers last week in a Pittsburgh steel plant which supplies aircraft - necessary steels. The government, in the views of most observers must soon act against strikes with all fangs bared or see production slump nationwide.

For a number of weeks THE IRON AGE has carried brief round-ups of current labor disturbances in steel producing centers and war production metalworking plants which, while not completely comprehensive, did serve to bring to light the number of minor controversies which were whittling away at war production. Most of these strikes involved no more than 200 men, some as few as 15 or 20. The lesson contained was that strong, unyielding labor control was facing this country—a fact now being more generally recognized.

Last Saturday, the NLRB, through a press release, admitted the weakness of the Smith-Connally anti-strike bill and intimated that section 8 of that bill was morally responsible for a great deal of the strike

trouble now being experienced. With the NLRB recognizing this fact, and with WMC's Paul V. McNutt clamoring for the transfer of 2,600,000 men to war industries, long odds are being laid here that labor will be the first subject of Congressional attention when reconvened and that the father draft question will be answered both to conserve manpower and to permit penalty-drafting of striking draft-eligibles.

o o o

Wage Scale Set for Metals Industries

New York

• • • **A minimum wage rate** in the metal, plastics, machinery, instrument and allied industries has been set by the Wage and Hour Division of the United States Department of Labor. On Jan. 27, the Administrator of the Wage and Hour Division appointed a committee to recommend minimum wage rates in accordance with Section 8 of the Fair Labor Standards Act of 1938. The committee, after investigating economic and competitive conditions in the industry filed with the Wage and Hour Division a report containing recommendation for a 40c. minimum hourly wage rate.

The decision of the administrator of the Wage and Hour Division as set forth said:

Wages at a rate of not less than 40c. per hour shall be paid by every employer to each of his employees who is engaged in commerce or in the production of goods for commerce in the metal, plastics, machinery, instrument, and allied industries.

The production of metals and the manufacture of any product or part made of metal or plastics; and the manufacture from any material of machinery, instruments, tools, electrical goods, transportation equipment, and ordnance.

However, the definition does not include:

1. The mining or milling of metalliferous ores.
2. The production of any basic material other than metal.
3. The further processing of any basic material other than metal or plastics; provided that such processing when performed by an establishment producing from such material a product of this industry or subassembly of such product shall be included within this definition.
4. Any product, the manufacture of which is covered by the definition of an industry for which the Administrator has already issued a wage order or appointed an industry committee.

The definition covers all occupations in the industry which are necessary to the production of the articles including clerical, maintenance, shipping, and selling occupations. However, this definition does not cover clerical, maintenance, shipping, and selling occupations when carried on in a wholesaling or selling department, physically segregated from the other departments of a manufacturing establishment, the greater part of which sales are sales of articles which have been purchased for resale. Where an employee covered by this definition is employed during the same work-week at two or more different minimum rates of pay, he shall be paid the highest of such rates for such work-week unless records concerning his employment are kept by his employer, in accordance with applicable regulations of the Wage and Hour Division.

This Wage Order No. 173 becomes effective Sept. 13, 1943.

•

After an indecisive trial of a controlled referral hiring plan applicable to all male labor in the Buffalo and Niagara Frontier industrial district, Mrs. Anna M. Rosenberg, regional director of the War Manpower Commission, has approved a proposal to formulate a substitute scheme.

•

One hundred machine shop employees of Timken Roller Bearing Co.'s steel plant voted on Aug. 27 to return to work after striking since Aug. 25. The men refused to work in protest to the assignment of Negro women workers as trainees in the machine shop.

•

Strikers at Republic Steel Corp. who keep 500 men idle two days in the Youngstown plant went back to work Aug. 27 pending an investigation of their grievance by the WLB.

•

Three hundred and fifty members of the United Automobile Workers who walked out at the Cleveland Hardware & Forging Co. on Aug. 26 returned to work Aug. 27. The grievances, chief of which was said to be timing of piece work jobs, will be placed before the WLB.

•

Three Ohio coal mines were closed Aug. 26 and 27 by a walkout of 2150 men, protesting the WLB refusal to approve portal-to-portal pay.

•

Two Alabama coal mines were closed by strikes following announcement that the WLB had rejected a proposed portal-to-portal payment of $1.25 per day.

•

The eight open hearths of the Granite City Steel Co., St. Louis, were down Tuesday because of a strike of 110 workers in that department. The dispute arose over the arrangement of days off in the new 48-hr. work week order by WMC.

•

A slowdown in the Conshohocken Pa., plant of the John Wood Mfg. Co. ended Monday when the War Labor Board took jurisdiction of the case. Seven days ago when the slowdown started, operations fell off 50 per cent. On the final day many of the departments had ceased working and average production for the entire plant dropped to 10 per cent.

•

The National War Labor Board told employers Aug. 27 that they could eliminate substandard wages by raising rates up to 40c. an hour without WLB approval even though this action might necessitate price relief.

•

George W. Taylor, vice-chairman of the National War Labor Board, said last week that average factory wage rates were increased by the WLB less than 1c. an hour during the first eight months of the wage stabilization program.

•

When Gov. Thomas E. Dewey of New York visited the Republic Steel Corp.'s Buffalo plant he was told by Donald B. Gillies, "we could use 10,000 more employees in our New York State plants if we could get them. Our ore mines in Rensselaer County are producing just half what they could if we had manpower."

•

Pre-Pearl Harbor fathers would seek war work if a definite labor policy between labor and management were adopted with the government acting as a trustee, charged with the responsibility of enforcement, Professor Walter Rautenstrauch, head of the industrial engineering department of Columbia University, said.

Miners Sentenced On Anti-Strike Law

Pittsburgh

• • • **Twenty-seven of 31 coal miners, recently indicted in Pittsburgh for strike fomenting were given six-month suspended sentences and placed on probation for three years after having plead guilty. Prosecution was under the new Smith-Connally anti-strike act. Three others now hospitalized will soon stand trial.**

•

War Affects Pipe And Tubing Trends

Pittsburgh

• • • **When compared with the** total tonnage of tubes and pipe produced in the past few years electric weld has made rapid gains, in per cent of the total. Seamless has lost some ground on a percentage basis but actual production was of course high. Lapweld which some steel observers had given up as lost has remained fairly steady since 1938 in relation to total tonnage. Such are some of the conclusions that can be drawn from the American Iron and Steel Institute figures released recently.

The subject of seamless versus electric weld has been getting plenty of quiet attention in the pipe and tube field. While the total tonnage of pipe and tube made by the seamless process far outstrips other methods, electric weld is climbing.

In 1938 electric weld pipe and tubing was only 10.4 per cent of the total production while in the past six months it has gone to 21.8 per cent of the total. Some of this gain is attributable to the increased use of electric weld in the aircraft industry.

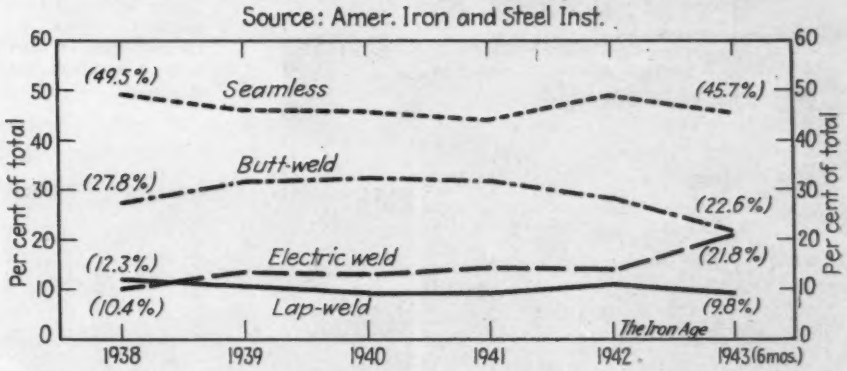
Buttweld pipe which accounted for 27.8 per cent of total tube and pipe production in 1938 gained in the period 1939 to 1941 but fell back on a percentage basis in 1942 and in the first six months of 1943. This is natural in view of the drop in construction since early 1942. It would not seem that the relative drop in the participation of buttweld will hold after the war when large scale construction of private projects is expected.

The situation with lapweld has belied the statements of some that this method of making pipe "has gone out the window." Actual production of lapweld in 1942 showed a gain over 1941—the only type that gained that year. Estimates for the first six months of this year indicate that lapweld output will be about the same as last year.

The falling off in the participation of seamless for the first six months of this year is believed to be due to cutbacks in the bomb program involving lighter weight bombs. There is no indication though that this fall back in its relative position will hold since there has been little oil country goods made in the past year.

PRODUCTION OF SEAMLESS, LAP-WELD, BUTT-WELD AND ELECTRIC WELD PIPES AND TUBES, 1938 - 1943

Source: Amer. Iron and Steel Inst.



Seamless	1,277,000 NT	1,735,000 NT	1,960,000 NT	2,535,000 NT	2,529,000 NT	1,324,000 NT
Lap-weld	316,000	382,000	384,000	529,000	569,000	283,000
Butt-weld	719,000	1,179,000	1,375,000	818,000	1,448,000	655,000
Electric weld	269,000	468,000	554,000	805,000	688,000	631,000
Total	2,581,000	3,764,000	4,273,000	5,687,000	5,234,000	2,893,000

Probably, because of the war, no concrete trends or conclusions can be drawn now except that electric weld will continue to gain and in many fields will strongly compete with seamless. In other words seamless, after the war, will have a strong pace setter according to some pipe people.

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Civilians May Get More Supply Depots

Chicago

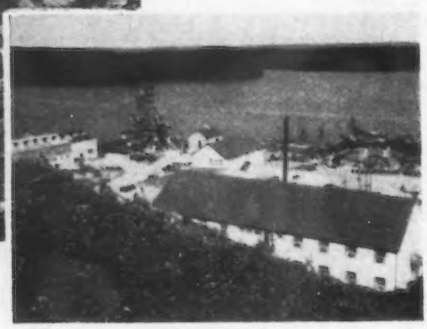
• • • **Operation of** Ordnance Department supply depots by civilian concerns rather than by military forces is turning out much better than had been expected, Maj. Gen. L. H. Campbell, Jr., ordnance department chief, reported here last week. The ordnance head predicted that additional depots will be turned over to private management in the future.

The conference was held in connection with a two-day meeting of commanding ordnance field service depots.

At present five depots are being operated by civilians and transfer of a sixth is under negotiation. The depots currently operated by private management are: Warren, Ohio, by Sears-Roebuck; Toledo by International Harvester; Anniston, Ala., by Chrysler; Milan, Tenn., by Procter & Gamble, and Ravenna, Ohio, by Atlas Powder. The Field Service Division operates more than 50 depots through the nation.

Gen. Campbell said that he thought the chief advantage of civilian operation was in the injection of new, enthusiastic blood into the plant.

LANDING ON KISKA: Swarming ashore from landing barges, U. S. and Canadian troops file up the hills from the Northwest coast of Kiska looking for Jap defenders. They did not know that the Japs had already fled the island.



THE STEEP ROCK lode lies under three lakes. These general views indicate the water which must be drained.

Steep Rock Ore Project Progressing; First Ore Expected Out by Autumn 1944

By S. H. BRAMS
Detroit Editor

Atikokan, Ont.

• • • **Marked progress** is evident in preparations for mining at Steep Rock Iron Mine, near Atikokan, Ont., a range expected to provide a source of a fairly considerable tonnage of premium ores. However, the extent of the work which is necessarily preliminary to actual mining is so great that schedules do not call for any removal of ores until autumn of 1944.

There are several major phases of the job in process and in prospect. The largest among them is the diversion of water feeding Steep Rock Lake, so that body of water can be pumped down to expose the three major ore bodies located thus far. Inherent in this part of the work is the building of tunnels, water runways and coffer dams. Second is the preparation of surface facilities for open pit mining—of course the latter will not be possible until the bottom of the lake has been exposed by drainage. Third is the construction of spur line and other rail facilities to move ore in volume from the mine to Fort William or Port Arthur, Ont., about 140 miles east and south. Finally, there must be built classifying and loading docks at the lakehead.

Each of these tasks involves a considerable engineering job. The schedule, as now drawn up, provides for completion of the water diversion engineering job by Nov. 1, 1943, or thereabouts. Thereafter an immediate start will be made on pumping out that portion of Steep Rock Lake in general lying over the ore deposits. During next winter, while this work is in initial stages, a spur line will be run through forest by the Canadian National Railway from its heavy track at Atikokan to the minehead. The distance is about four miles.

Plans are being completed at this time for erection of suitable loading facilities at Fort William or Port Arthur, Ont., probably the latter. These will not have to be of a size commensurate with the loading docks at Duluth. They will be built by Canadian National.

Crushing facilities will be installed starting next summer. There will be a primary and secondary crusher, and a screening plant.

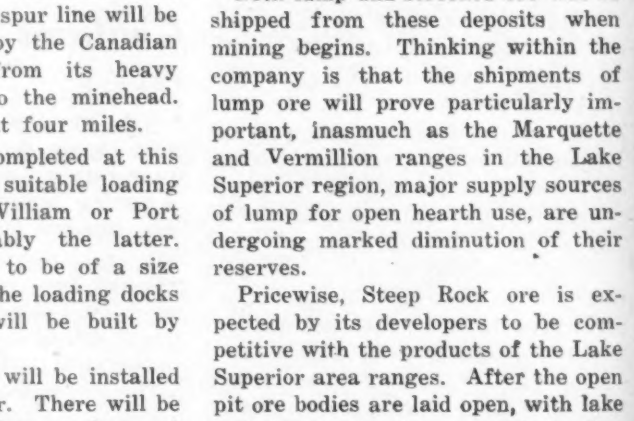
Open pit mining will be exclusively utilized for ore removal for the next several years. Probably it will be 1948 or thereabouts before any shafts are put down, so no provision is being made at this time for any underground facilities, although these are definitely contemplated for the future.

Latest estimates indicate a gross ore supply on the Steep Rock claims of approximately 31,600,000 tons. Except for a small proportion, this tonnage requires no treatment. After sintering of the small proportion of high sulphur content ores, the net total is nearly 31,000,000 tons. This ore runs, in the main, between 60 and 61 per cent iron. It is all hematite. In addition, there is a third and largely uncharted ore zone on the property, also under Steep Rock Lake, which likely will enlarge the supply total quite considerably after more comprehensive churn drilling through the ice this coming winter. Beyond that, the second of the two zones proved in greater detail is not yet completely blocked out, so today's reserve figures are minimum and conservative.

Both lump and screened ore will be shipped from these deposits when mining begins. Thinking within the company is that the shipments of lump ore will prove particularly important, inasmuch as the Marquette and Vermillion ranges in the Lake Superior region, major supply sources of lump for open hearth use, are undergoing marked diminution of their reserves.

Pricewise, Steep Rock ore is expected by its developers to be competitive with the products of the Lake Superior area ranges. After the open pit ore bodies are laid open, with lake and clay overburden removed, the Ontario operation will have some slight advantage in slightly lower wage

CONSUMPTION PEAK: Latest figures on Lake Superior ore stocks and consumption show ore consumption during July at a record peak while stocks are about 5,000,000 tons below a year ago. This graphical analysis by THE IRON AGE showing stocks, consumption and blast furnace operations compared, points out the annual peaks in deliveries of ore and the steady consumption which quickly dwindles stocks after December lake closings.



scale. Freight haul will be higher by a few cents, the distance to port being about 140 miles, against 85 to 100 miles for most Lake Superior range mines. The lake haul to lower lake ports should be somewhat less expensive, distance being somewhat reduced.

Actual removal of the ore from the pits will find Steep Rock operating at both advantage and disadvantage. Although no ore body has yet been seen, indications are that the content is largely in rock form, as distinguished from the more fragmented ore areas of Minnesota. Blasting will be necessary at Steep Rock to break up the ore, thus imposing added costs above customary range practice.

The mine does not now contemplate installation of a sintering mill at this time, nor probably for several years. Sulphur ores removed from the pits will be stockpiled until quantity is sufficient to justify a start on the sintering operations.

Total ore is estimated in new analyses at 31,580,086 tons, of which 17,244,080 have been proved and 14,336,006 are probable. Of the total, 26,752,883 are open pit ores, of which 16,168,091 have been proved. An estimate of total of high sulphur ore, sulphide ore and some standard ore sintered stands at 30,981,913 tons, of which 16,757,946 are proved and the remainder probable.

Steep Rock hopes to make token shipments or better of its first ore about a year from now. Mill men in the states are interested in seeing how this ore performs in their furnaces—the tests undertaken at Buffalo last year intrigued them considerably. Should actual shipments confirm the test drillings, Steep Rock may prove to be a source of choice charging stock and open hearth sweetener for many years to come, a new range which will amply justify the $7,000,000 outlay of the RFC and debenture holders to put it into operation.

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Canada Starts Cutting Some Contracts

Toronto

• • • **Canada** has started curtailment in some types of war production and will result in the laying off of hundreds of workers in the plants affected. Orders issued by the Government cancelled the contract for the manufacture of a certain type of bomb being made in the Woodstock, Ont., plant of Massey-Harris Ltd. for the British Government. This contract cancellation will affect 245 workers, some of whom will be retained by the company in its other plants. Production will continue until present stock inventories have been cleaned up. No word has been received from Ottawa that other contracts will be forthcoming and it is stated that this branch of the plant will be closed. However, truck bodies and wagons will continue to be turned out at the Woodstock works, employing about 200 workers.

Three other Canadian plants also received notice to discontinue war contracts, including Northern Engineering Co., at Fort William, Ont., working on shells and bombs; the Montreal shell works of Canadian Tube & Steel Ltd., and National Steel Car Corp., Hamilton, Ont.

Sir James Dunn, president of Algoma Steel Corp. Ltd., stated last week that under arrangements with the Dominion Government the company's expansion program which includes coke ovens, coal storage and docks, blast furnaces and other steel making installations are nearing completion. He said the new battery of coke ovens, the docks and storage units have been completed and are in use, and the by-products plant is almost ready for operation. The No. 2 blast furnace has been rebuilt and is operating, and the No. 5 blast furnace will blow in in August. This new furnace, of the most modern design and the largest in the British Commonwealth, however, had not blown in at the time of going to press, although company officials expect it to start any day. The president stated that "during the past fiscal year ending with April, due to necessity for increased steel production and again conforming to wishes of the Dominion Government, Algoma Steel Corp., has been constructing works necessary to increase its annual steel capacity by 235,000 net tons of ingots."

Reviewing other developments of the corporation, Sir James Dunn stated: "The corporation's wholly owned subsidiary, Algoma Ore Properties Ltd., produced and shipped in the fiscal year, 414,602 tons of sinter iron ore from its New Helen Mines compared with 487,865 tons in the year immediately preceding. This decrease of 73,263 tons resulted from the late opening of navigation. Of the 416,602 tons shipped in the year under review, 220,065 tons were delivered to United States' furnaces and 194,537 tons to the company's own furnaces at Sault Ste. Marie, Ont. Production of sinter ore in the current year is expected to total 450,000 tons. During the past year $246,392 was expended on mining equipment and spares at the mine and sintering plants.

"Algoma Ore Properties Ltd., has continued intensive exploration operations covering several of its properties and during the past three years has expended $230,298 on stripping, trenching and diamond drilling. One of these properties situated within 50 miles of Sault Ste. Marie, has been in part closely drilled in the past two years, (sections 150 feet apart with each section having two or three drill holes), and the company's engineer in charge of operations, George W. MacLeod, B.Sc., estimated 50,000 tons of magnetite without any deleterious ingredients and capable of producing 20,000,000 tons of 64 per cent iron concentrate. The area so far drilled and estimated to contain 50,000,000 tons of ore covers a length of 4,500 feet. Exploratory drill holes several hundred feet below the levels considered in the above estimate show the deposits still persists and the deepest hole, so far drilled, has not bottomed the ore. Some 3,500 feet of territory on which magnetite is indicated remain to be drilled."

TRANSPORTS AT KISKA: Transports stand off Kiska's shores while landing craft ply back and forth from the beaches bearing men and equipment for the occupation of Kiska.

Press Association, Inc.

Big Steel Appoints Geneva Head

Geneva, Utah

• • • The United States Steel Corp. is taking no chances on assuring the best possible management for its new subsidiary, Geneva Steel Co. here which is to operate the huge DPC steel plant. It has taken one of its ace production men for president and an important sales official to head up sales. Other men with long experience have also been named as officers.

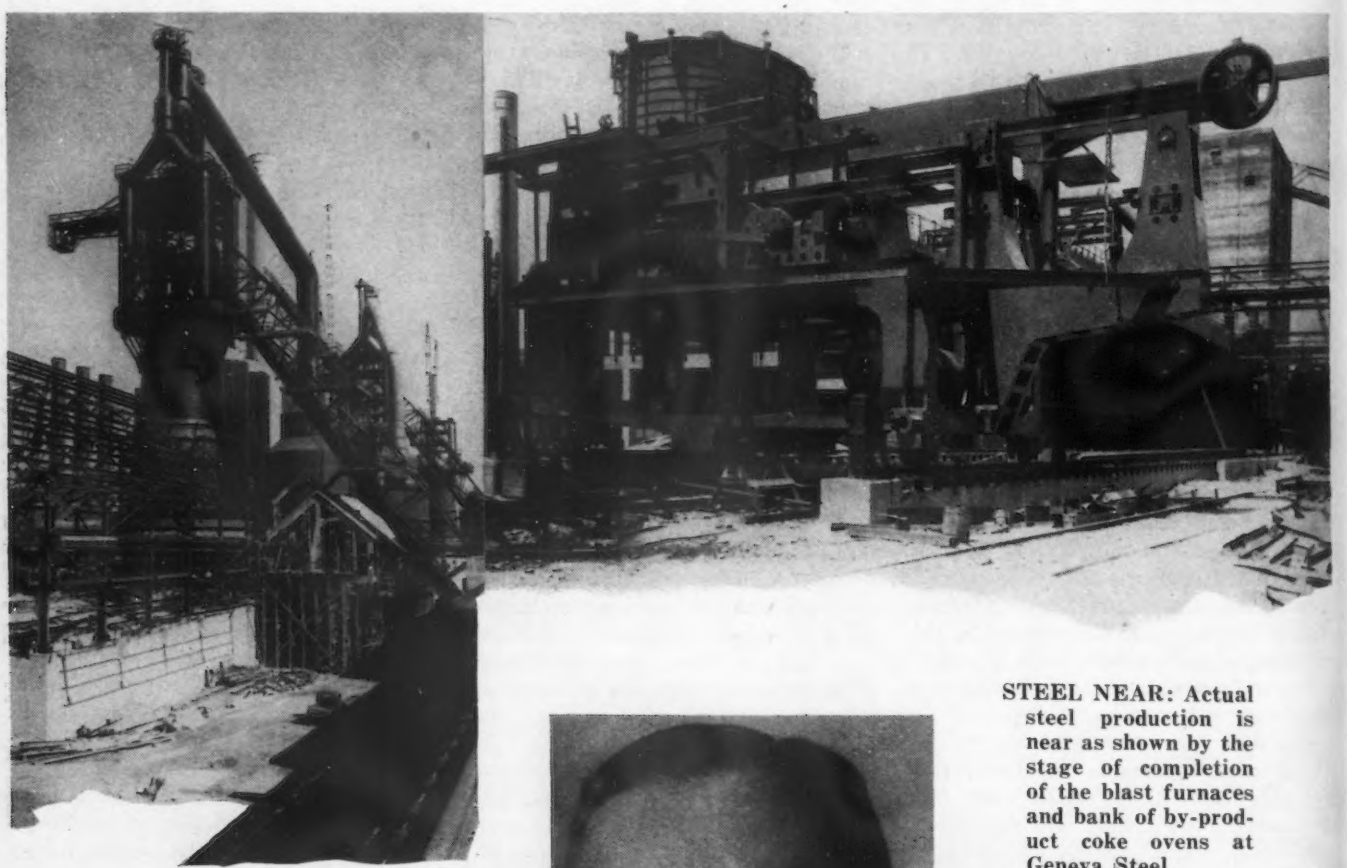
Walter Mathesius, vice president in charge of operations, United States Steel Corp. of Del., has been made president and a director. Other officers elected, all of whom will serve as members of the board of directors, are: J. R. Gregory, vice president-sales; J. E. Butler, controller; J. Wohlend, treasurer; and Merrill Russell, secretary and general attorney. Headquarters of the company will be located here.

Mr. Mathesius, who will build the organization of the new company preparatory to expected operation of the plant late this year, has been with United States Steel since 1911. He served as general superintendent of Carnegie-Illinois Steel Corp. South Chicago works, and in 1935 he was made manager of operations of the Chicago district.

Mr. Gregory, associated with U. S. Steel for 25 years, has been vice-president and general manager of sales for Columbia Steel Co., U. S. Steel's West Coast subsidiary.

Both Mr. Butler and Mr. Wohlend have been members of the Columbia Steel organization for a number of years. Most recently Mr. Butler has been in charge of accounting on the Geneva works construction project. Mr. Wohlend was formerly assistant treasurer of Columbia Steel Co.

Mr. Russell has been a member of the law firm of Knapp, Cushing, Hershberger and Stevenson, Chicago division counsel for United States Steel, and has been identified in a legal capacity with the construction work at Geneva.



GENEVA STEEL NEARS PRODUCTION: The $180-million Geneva Steel Works, Geneva, Utah, the largest integrated steel mill west of the Mississippi, nears the day when it will be in full operation by Geneva Steel Co., U. S. Steel Corp. subsidiary acting for the DPC. The plant was designed and is being built by Columbia Steel Co., another U.S.S. subsidiary, and will later be operated by Geneva Steel under the direction of newly elected Walther Mathesius as president. Operation will be without compensation to U.S.S.

STEEL NEAR: Actual steel production is near as shown by the stage of completion of the blast furnaces and bank of by-product coke ovens at Geneva Steel.

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NEW GENEVA STEEL BOSS: Walther Mathesius, vice-president in charge of operations of the U. S. Steel Corp. of Del., has been elected president and director of Geneva Steel Co. at Geneva, Utah, to operate the nearly completed plant for the DPC.

DPC Coke Ovens Start at Inland

Chicago

••• A battery of Defense Plant Corp. coke ovens, built under the supervision of the Inland Steel Co. at Indiana Harbor, began pushing urgently needed coke for war production purposes Aug. 26.

Seventy-three ovens went into operation to push an estimated 1,000 tons of coke daily. Heavy wartime demands have created a coke scarcity in the Chicago district, as well as in most other areas of the country.

The ovens are part of a project undertaken for the Defense Plant Corp. by Inland Steel. The project consists of two new blast furnaces and related facilities, including also a second battery of coke ovens.

Steel Production for Sale in July Up Slightly from June

Source: American Iron and Steel Institute

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons							
					Current Month				Year to Date			
					Total	Per cent of capacity	Shipments Export *	Shipments To members of the industry for conversion into further finished products	Total	Per Cent of capacity	Shipments Export *	Shipments To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	44	1	xxxxxxx	546,331	xxx		196,970	4,673,381	xxx		1,371,097
	Heavy structural shapes	10	2	5,412,580	298,291	65.0		xxxxxxx	2,185,006	69.5		xxxxxxx
	Steel piling	4	3	338,000	8,517	29.7		xxxxxxx	22,581	11.5		xxxxxxx
	Plates—Sheared and Universal	21	4	9,189,740	1,051,288	135.0		3,288	7,451,113	139.6		22,668
	Skelp	6	5	xxxxxxx	57,240	xxx		41,808	468,479	xxx		279,628
	Rails—Standard (over 60 lbs.)	4	6	3,529,260	148,096	46.1		xxxxxxx	1,041,265	49.4		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	21,047	85.2		xxxxxxx	102,806	57.1		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	2,438	28.2		xxxxxxx	15,325	25.9		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	46,235	48.7		xxxxxxx	370,108	56.9		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	594,575	xxx		80,640	4,141,966	xxx		223,232
	Concrete reinforcing—New billet	15	11	xxxxxxx	39,251	xxx		xxxxxxx	253,404	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	6,141	xxx		xxxxxxx	53,642	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	148,387	xxx		xxxxxxx	1,025,919	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	251,419	xxx		34,816	1,776,425	xxx		264,004
	Cold finished	19	15	xxxxxxx	39,871	xxx		xxxxxxx	280,308	xxx		xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	8,798	xxx		xxxxxxx	60,130	xxx		xxxxxxx
	TOTAL BARS	63	17	14,719,525	1,088,522	87.2		115,456	7,591,795	88.8		817,536
	Tool steel bars (rolled and forged)	17	18	200,840	17,263	101.4		xxxxxxx	137,050	117.5		xxxxxxx
	Pipe and tube—B. W.	12	19	2,231,040	109,936	58.1		xxxxxxx	764,953	59.0		xxxxxxx
	L. W.	8	20	845,400	44,704	62.4		xxxxxxx	327,615	66.7		xxxxxxx
	Electric weld	6	21	1,149,250	82,906	85.1		xxxxxxx	502,301	90.2		xxxxxxx
	Seamless	15	22	3,082,400	180,225	69.0		xxxxxxx	1,241,693	69.3		xxxxxxx
	Conduit	7	23	192,000	4,003	24.9		xxxxxxx	35,365	32.0		xxxxxxx
	Mechanical Tubing	11	24	597,800	51,978	122.3		xxxxxxx	435,654	125.4		xxxxxxx
	Wire rods	22	25	xxxxxxx	98,506	xxx		19,422	596,377	xxx		138,255
	Wire—Drawn	41	26	2,355,350	164,120	82.2		5,970	1,139,387	83.2		35,047
	Nails and staples	19	27	1,116,640	55,923	59.6		xxxxxxx	490,304	75.5		xxxxxxx
	Barbed and twisted	15	28	482,280	20,480	50.1		xxxxxxx	142,567	50.9		xxxxxxx
	Woven wire fence	16	29	778,060	23,224	35.2		xxxxxxx	129,626	28.7		xxxxxxx
	Bale ties	12	30	128,420	9,929	91.2		xxxxxxx	65,414	87.7		xxxxxxx
	All other wire products	8	31	78,220	4,536	68.4		xxxxxxx	35,624	78.4		xxxxxxx
	Fence posts	11	32	112,065	5,356	56.4		xxxxxxx	19,289	29.5		xxxxxxx
	Black plate	10	33	339,700	27,496	92.5		-	175,398	88.9		-
	Tin plate—Hot rolled	4	34	483,620	1,046	2.6		xxxxxxx	10,597	3.8		xxxxxxx
	Cold reduced	10	35	3,841,340	207,571	63.7		xxxxxxx	1,283,830	57.5		xxxxxxx
	Sheets—Hot rolled	10	36	xxxxxxx	487,541	xxx		19,428	3,505,278	xxx		119,664
	Galvanized	14	37	xxxxxxx	67,259	xxx		xxxxxxx	469,148	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	120,426	xxx		xxxxxxx	858,251	xxx		xxxxxxx
	All other	15	39	xxxxxxx	28,124	xxx		xxxxxxx	211,192	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	703,350	61.5		19,428	5,043,869	64.3		119,664
	Strip—Hot rolled	22	41	3,201,690	120,425	44.4		17,381	886,327	47.7		102,749
	Cold rolled	39	42	2,059,740	100,355	57.5		xxxxxxx	668,476	55.9		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	19,270	53.5		xxxxxxx	131,133	53.1		xxxxxxx
	Axles	6	44	453,470	11,784	30.7		xxxxxxx	95,078	36.1		xxxxxxx
	Track spikes	11	45	308,350	9,428	36.1		xxxxxxx	85,492	47.7		xxxxxxx
	All other	5	46	xxxxxxx	16,415	xxx		xxxxxxx	116,352	xxx		xxxxxxx
	TOTAL STEEL PRODUCTS	159	47	xxxxxxx	5,488,735	xxx		419,723	38,681,830	xxx		2,886,644
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	722,989	xxx		356,264	5,206,248	xxx		2,498,647
	Ingot moulds	3	49	xxxxxxx	83,182	xxx		xxxxxxx	562,451	xxx		xxxxxxx
Iron Products	Bars	10	50	170,110	8,000	55.5		291	57,212	57.9		1,970
	Pipe and tubes	2	51	106,000	7,489	83.3		xxxxxxx	51,175	83.1		xxxxxxx
	All other	1	52	56,000	1,165	24.5		-	8,505	26.1		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	16,654	xxx		291	116,892	xxx		1,970

Total number of companies included, 183.
During 1942, the companies included above represented 98.8% of the total output of finished rolled products.

* In accordance with Government policy, export figures cannot be published.

Steel Men Doubt Civilian Article Production; Eye Essential Use Demands

Pittsburgh

• • • **Booked to capacity** for the balance of the year and with some makers filling first quarter books at a rapid rate, steel men here do not take Washington talk seriously that ordinary civilian articles in any sizeable amount may soon be in production again. This is particularly true, they say, in view of the 4,000,000 ton over-demand for steel in the fourth quarter, the present and worsening labor shortage, and the almost emergency demands for steel by the railroads, oil producers and farm implement makers.

Such talk, about a return to some of the civilian items, which were shut off last year, has appeared from time to time but each time was found to have no basis in fact. To the contrary, steel men say that essential items for the railroads and others have often been thrown off mill schedules because of more urgent war needs.

At the present time every effort is being made to supply plates for railroad cars which are sorely needed in the fourth quarter. In many cases even if the plates are obtained there may be some delay owing to the tightness in bars and other items that go into the making of freight cars. Nevertheless, even this latest effort may run into difficulty if the Maritime Commission gets its way in asking for more steel.

Aside from these factors, however, steel officials believe that recurrent tales of "back to normalcy" cannot help but have an adverse morale effect on steel and other workers. Moreover it is queried here that even if some of the more common civilian items were made in any quantities, where would the labor come from to make them?

Already many mills that are soon to come into operation for the first time are having more than a tough time getting labor. One of the large Western steel plants which is slated to go into operation late this Fall is having its share of trouble getting workers. So far, its personnel men are tearing their hair out wondering where they will get not only skilled workers but unskilled as well. This same condition applies not only to the steel industry but to other new enterprises. The condition is expected to get worse before it gets better.

•

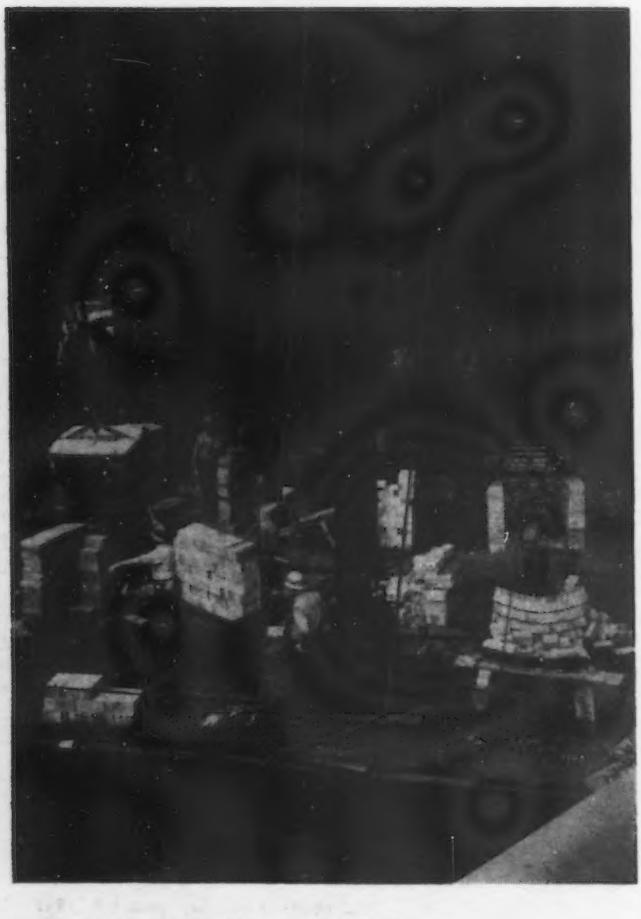
400,000 Tons of SRC Steel for Civilians

Washington

• • • **With the Steel Recovery Corp.** soon to pass out of existence a small group will be set up in the WPB Steel Division to carry on the work.

Last Friday, WPB told manufacturers of permitted civilian products that they might possibly increase their output through the purchase of some of the excess or frozen steel stocks listed as available by SRC. The corporation now lists about 400,000 tons of such steel which remains unsold.

These stocks can be used over and above the CMP allotment made to the individual manufacturer. So long as he does not violate WPB limitation order, the manufacturer does not have to deduct such steel from his allotment.



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Bethlehem Sets Relining Record

RELINED IN 18 DAYS, 20½ HR.: The Johnstown plant of Bethlehem Steel Co. claimed a record Aug. 28 when No. 6 blast furnace was lighted after 18 days, 20½ hr. spent in relining. At left is the work in progress. Above, general manager R. E. Hough (left) is shaking hands with E. W. Trexler, superintendent of the mechanical department. Hough had estimated that the job probably would require 23 days. The stack was built in 1879. Its capacity is about 21,000 tons per month.

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Overtime Costs May Be Included In Malleable Iron Casting Price Totals

Washington

• • • **Sellers of malleable** iron castings were authorized by OPA Aug. 31 to add overtime costs in computing their maximum prices when using the "formula" or "pre-base period" pricing methods provided in MPR No. 241. The procedure for adding overtime costs is established in Amendment No. 4 to the order effective Sept. 4.

Sellers of malleable iron castings under the regulation have three methods they may use in determining their maximum price: (1) The "base period" method, (2) the "formula" method, (3) the "pre-base period" method.

Under the "base period" method, maximum prices are the highest at which the producer contracted to sell between Oct. 1 and Oct. 15, 1941. This amendment does not permit the adding of overtime costs to "base period" maximum prices.

Under the "formula" method of determining maximum prices, the seller must use his pricing method in effect for him on Oct. 15, 1941, employing the same rates, bases and customary mark-up used by him on that date, except that he may compute overhead rates on the basis of his experience in the foundry during the period from Jan. 1, to June 30, 1942.

Under the "pre-base period" method of computing ceilings, the seller's maximum price is established as the actual price at which he last sold a similar casting prior to Oct. 1, 1941.

The method by which overtime costs may be added in computing "pre-base period" and "formula" maximum prices is divided into four steps:

(1) The seller selects whether he shall compute overtime on a monthly or quarterly basis.

(2) He then computes the overtime premium per dollar of sales of malleable iron castings for the month or quarter, as the case may be, which precedes the period in which the casting in question is priced.

(3) He reduces this overtime premium per dollar of sales by the percentage by which average hourly earnings during the preceding period exceeds average hourly earnings in his plant in the payroll period immediately preceding Oct. 15, 1941.

(4) He applies the resultant rate in (3) to the maximum price of the casting which would otherwise be arrived at without the inclusion of any overtime.

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Chromium Plating Permitted on Cutlery

• • • **WPB has amended** Order L-140-a to permit manufacturers of cutlery to use chrome acid type chromium plating on all types of cutlery. In the original order issued July 1, the use of chromium plating was limited to household table cutlery and hand hair clippers. Amendment 2 to General Limitation Order L-140-a, was issued Aug. 23.

WPB Reports Asked On Civilian Type Products

Washington

• • • **Interpretation No. 15** to CMP Reg. 1, issued on Monday, told manufacturers of Class A civilian type end products who will be unable to meet all authorized production schedules that they should report the matter to the appropriate WPB Industry division. Class A civilian type end products are specified items which are purchased by claimant agencies directly from the manufacturer.

Petroleum Distributors Get New WPB Section

Washington

• • • **Establishment of a new** supplies section devoted exclusively to problems of petroleum equipment distributors was announced last week by the Wholesale and Retail Trade Division, WPB.

The Section has been set up to facilitate procurement of supplies by petroleum equipment distributors needed in the oil production expansion program, and will also be a focal point for all problems of distribution affecting petroleum supply distributors. All WPB-547 applications (formerly PD-1X) for priority assistance in the petroleum supply field will be processed in this section.

Tomiska Appointed WPB Director by Batcheller

• • • **E. F. Tomiska** of New York, deputy director of WPB Containers Division, was appointed director last week by Operations Vice-Chairman Hiland G. Batcheller. He succeeds Roswell G. Mower, of Chicago, who resigned as director effective Aug. 28.

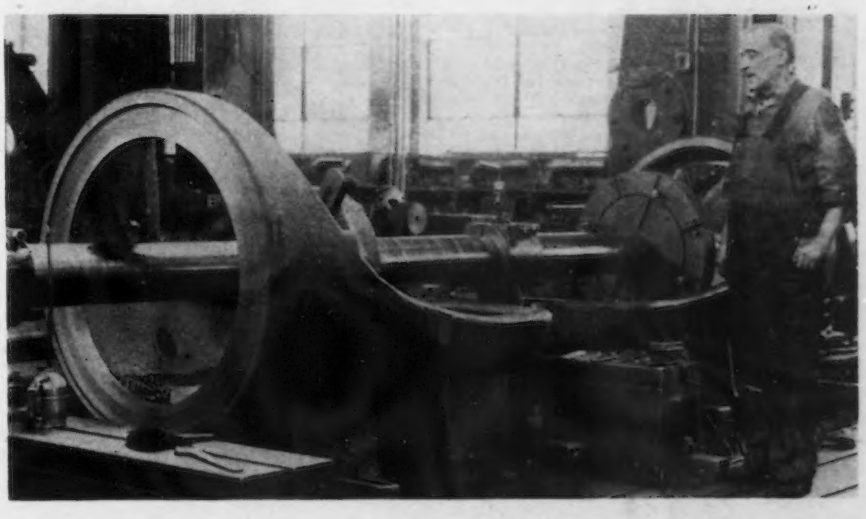
Rail Steel and Bessemer Approved for Bed Spring Use

Washington

• • • **WPB has granted** permission to use rail steel angles and bessemer or low carbon steel for frames and borders in the manufacture of coil, flat and fabric bed springs through an amendment to Order L-49.

In order to permit use of this material, manufacturers' quota allowances of iron and steel for bed spring production during the three months beginning July 1, have been increased from 3⅛ per cent to 10 per cent of the amount used by each manufacturer in his aggregate production of coil, flat and fabric bed springs during the base period July 1, 1940-June 30. 1941.

TWO INSTEAD OF ONE: A suggestion by Harvey Darling, worker at the Cooper-Bessemer Corp., machines two compressor tail guides in place of one in a single operation.



WPB Asks 50,000 Tons More Plates Per Month to Bolster Maritime Program

Washington

• • • **To meet increased plate** demand occasioned by the stepped-up Maritime Commission 1943 merchant shipping program of 20,000,000 tons, WPB will direct the rolling of 50,000 tons more plates a month in the fourth quarter than were rolled in the previous three months.

In the third quarter, the Steel Division estimates that 3,217,000 tons of plate will be produced. The new directive will result in the rolling of approximately 3,420,000 tons of plate in the fourth quarter.

Some tonnage will be obtained at the sacrifice of sheet production, but not all of it, a responsible Steel Division authority says. The dislocation of other flat rolled products, the readjustment of production directives for other purposes, and increases in production caused by an anticipated better labor condition is expected to account for the rest.

As expected now, Maritime will receive fourth quarter allotments as follows: October, 543,000 tons; November and December 550,000 tons each. During the third quarter Maritime was allotted 500,000 tons a month.

Maritime and WPB conferences last week resulted in agreement that the old plate scheduling form PD-169 would not be returned to use. Maritime had previously urged that the old method be reinstated. The joint decision to continue plate production under CMP was caused by the fear of conflict which would likely be caused by the operation of two different scheduling systems.

Steel Division officials contend that 95 per cent of delivery promises are now being met by the mills under CMP. The remaining tonnage is receiving special attention and expedition so that it too is produced and delivered close to the time it is promised.

The Maritime Commission has been concerned about the carry-over of tonnage from month to month and has claimed that it is entitled to a new supply of steel monthly equal to the amount of its allotments. The commission now understands as the result of recent conferences with WPB, that carry-over has been caused by the coal strike, hot weather and breakdowns.

Likewise, the recent conferences convinced Maritime that the Army and Navy plate allotments have not been increased. Maritime was under this impression and this misunderstanding was one of its complaints.

Priority Changes

L-286-a—Supplement to Order L-286 permits farmers and ranchers 100 rounds of 0.22 caliber rim fire cartridges, 20 rounds of center fire rifle ammunition and 25 rounds of shotgun shells in addition to regular quarterly quota. (8-24-43)

•

M-160-a—Amendment to M-160 providing for reclamation of beryllium copper scrap sets up mechanism for segregating it, and channeling it back to manufacturer of beryllium scrap master alloy. In making this change Order M-9-b exempted from its provisions control of scrap containing more than 10 per cent beryllium content. (8-24-43)

•

L-140-a—Amendment 2 permits manufacturers of cutlery to use chrome acid type chromium plating on all types of cutlery. (8-24-43)

•

L-257 and L-257-a—Provides manufacturers of farm machinery with production schedules through July, 1945. Producers are given poundage quotas based on production years 1940 or 1941, whichever is the higher. (8-24-43)

•

L-143-a—Amendment awards authority to schedule shipments of particular rubber processing machinery items to WPB.

•

L-49—Amendment permits use of rail steel angle frames on coil and fabric bed and mattress springs.

•

L-180—Amendment permits any manufacturer, except those located in Niagara Falls, Los Angeles, San Francisco, Portland, Ore., and Seattle, Wash., to increase production of replacement batteries up to 5 per cent over 1941 sales, providing their total sales for that year were over 25,000 units.

•

M-339—Newly created order which combines in a single order the restrictions on the use of copper and of zinc in printing plates formerly governed by M-9-c and M-99.

•

L-236—Schedule II specifies permitted sizes, types and grades of marine joiner hardware, and materials that may be used in its manufacture.

•

L-49—Permits use of rail steel angles and Bessemer or low carbon steel for frames and borders in the manufacture of coil, flat and fabric bed springs.

•

L-311—Controls the distribution and manufacture of logging, lumber, and wood products machinery and equipment.

•

11B—Amendment rules that preference ratings under this regulation are no longer available to producers of class A and B products.

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OPA Clarifies Ferrochromium Price

New York

• • • **Questions have arisen** as to how the maximum price of ferrochromium especially prepared for welding rod purposes should be determined under Maximum Price Regulation No. 407.

In order to be suitable for welding rod purposes, ferrochromium requires great care in grinding, and, in order to eliminate any large oversized pieces, it is necessary to double screen it after grinding. The oversized pieces are liable to cut the dies used in making welding rods. The welding rod industry requires a product which is not only very uniform as to size but one which on screens below 80 mesh follow their normal course of graduation.

Such a product can be only produced in relatively small units of not more than 1,000 lb. as a larger production unit tends to produce an excessive amount of fines.

Because of the additional expense in producing such a product, it is reasonable that any specifications, that require such close control of size, be classified as special grinding, and the maximum prices of the established standard sizes do not apply. Therefore, when such special grinding is required, the producer may charge the same price he charged during January, February and March 1942. In addition, MPR 407 provides that, for those manufacturers who did not have any sales of special grinds during that period, requests for approval of a special maximum price should be made to OPA.

•

Study Not Completed On Ore Price Increase

Washington

• • • **It is expected** that it will be at least two or three weeks before OPA completes its study regarding the request of lake ore producers for a price increase of 30c. a ton. Reports that OPA was agreeable to an increase of 15c. were declared to be wholly without foundation. At OPA it was stated that inasmuch as the study still is under way no conclusion has been reached.

The request for an increase in price is based on higher costs, including a wage boost of 5½c. an hour and higher boat rates. The greatest increase in costs applies to the deep mines in Michigan.

Charcoal Iron Price Raised $6 a Ton; OPA Says No Effect on Living Costs

Washington

• • • **Apparently fearful** that as small an item as it is, it might stir up visions of inflation, OPA on Monday, in announcing a $6 a ton increase in the price of charcoal pig iron gravely said that the higher price will not affect the cost of living, "for charcoal pig iron is not a cost-of-living commodity." To clinch its point OPA, with greater significance, added that it will not bring any change in the level of steel prices. By some this latter statement was taken to have served notice that the rising sentiment in portion of the steel industry for increased prices will not be recognized—at least for the present.

The charcoal pig iron price was increased, as of July 1, to $34 from $28 per gross ton, f.o.b. furnace and affects the only two makers, the Newberry Lumber & Chemical Co., Newberry, Mich., and the Antrim Iron Co., Mancelona, Mich., who are producing this metal. The annual capacity of the two producers is about 55,000 tons. They both said that they had been producing charcoal iron at a loss.

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WPB Standardizes Pipe Specifications

Washington

• • • **In order to obtain** maximum production from existing facilities, WPB on Monday established standard specifications for steel pressure pipe, steel pressure tubes and other types of steel pipe.

The specifications are embodied in Schedules 11, 12 and 13 to Order L-211. Schedule 11 provides specifications and standard sizes for steel pressure pipe commonly used in power plants and certain industrial plants. The specifications cover both carbon and alloy steel piping in lap welded, seamless, electric resistance welded, and fusion welded grades. A large proportion of current production is already in substantial agreement with the provisions of the schedule.

Schedule 12, covering steel pressure tubes, includes boiler, cracking still, heat exchanger, condenser and superheater tubes. They are especially important for oil, synthetic rubber and chemical production.

Schedule 13 sets up specifications for steel pipe, exclusive of pipe covered by other schedules, and certain specialty items such as corrugated pipe, dredge pipe, etc. The schedule will require a reduction of about 65 per cent in the number of sizes and wall thicknesses shown in various pipe mill catalogues.

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P & W Film for Training Foremen

East Hartford, Conn.

• • • **The importance of maintaining** good human relations not only with workers in his department but also in dealing with various staff departments and with foremen on other shifts is stressed in a new film designed to aid foremen, called "It's Our Job." The picture was produced for the training department of Pratt & Whitney Division of United Aircraft Corp., by Wilding Picture Productions, Inc., and was originally intended for use within the company only. Arrangements are now being made however to handle the distribution of this picture to other interested manufacturers on a service basis. The film lasts 41 min. and is available for 16 mm. sound projection. Inquiries should be directed to H. C. O'Sullivan, director of training, United Aircraft Corp., East Hartford, Conn.

WPB Sets Up Central Bill of Materials Index

Washington

• • • **WPB has established** a central Bills of Materials Index File to eliminate duplicate requests for bills previously made by various claimant agencies, it was announced on Monday. The file will index all bills of Class B products and certain Class A products which have been obtained by the Industry Divisions and the Claimant Agencies. Claimant Agencies and Industry Divisions are now instructed to consult the central index file before requesting prime consumers to submit end product bills of material.

WPB Calls Attention To Filing of Form WPB-541

• • • **Application Form WPB-541** (previously PD-1A) instructs the filing of all such applications with the nearest field office of the War Production Board.

Washington has called attention to the receipt of many applications by various Industry Divisions, indicating that these instructions are being overlooked. The system of screening all WPB-541 applications by the field offices and the processing of all those for less than $500 by the regional office was inaugurated entirely for the benefit of applicants in a more speedy determination of the assistance requested.

Applications made direct to Washington tend to disrupt their ordinary processing and may result in considerable delay in their return to the applicant.

Additional CMP Developments

• Amendment No. 3 to Reg. No. 5 provides that a person leasing equipment to others may use either his own or his customers' preference ratings and symbols to obtain repair and maintenance equipment.

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• Directive 23 to Reg. 1 is intended to reduce to a minimum the past due backlog orders. Fabricators of aluminum are warned that if this is not achieved the directive will have to be redrafted.

•

• Int. 14 to Reg. 1 clarifies use of quarterly identification symbol in connection with placement of orders under CMP. Quarterly identification need not be shown in placing orders for Class B product components or other production materials, except CMP. Allotment No. must be shown on all orders placed with reference ratings under CMP.

•

• Interpretation 6 to Reg. 1 rules that records required to be kept by paragraph 944.15 of PR 1 or by any other order or regulation of the WPB may be kept in the form of microfilm or other photographic copies instead of the originals.

•

• Interpretation 15 to CMP 1 rules that manufacturers of Class A civilian type and products who find their capacity insufficient to produce within the quarter all orders received must report that fact to WPB. This extends to labor bottlenecks as well as to physical capacity.

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• Interpretation 13 to Reg. 1 states that when Class A product allotment procedure is used for making allotments to manufacturers of Class B products all provisions of CMP regulations covering Class A products apply.

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• Amendment 1 to Directive 16 adds 30 new items concerned with the production of aircraft.

WPB Starts Nation-Wide CMP Audit Of Industry; Finds 30% with Infractions

Washington

• • • **To keep CMP operation** in line, WPB has started a nation-wide spot-audit of industry. WPB says that the program contemplates a coverage of the major use of controlled materials together with a selective auditing of both large and small companies.

Already, the results of audits finished and now in process show that about 30 per cent of the companies records inspected contained "irregularities of a sufficient degree to warrant corrective action."

Many of the infractions are not serious. WPB's thought is that failure to correct them would result in a deterioration of compliance which soon would jeopardize the ability of industry to deliver products according to schedule.

The irregularities which have been discovered involve the failure to return unneeded allotments, the placing of orders in excess of allotments received, and the consequent building up of stocks which violate the CMP 60-day inventory rule. WPB says that the reason for these violations invariably is poorly kept or inadequate records.

Perhaps the most serious and common fault found is the failure to return unneeded allotments. WPB urges manufacturers to realize that the retention of allotments not needed makes them morally responsible for "failure to relieve the cut-back of the vital war and civilian production programs."

The remedial action taken by the WPB compliance department is graduated to the nature and the seriousness of the offence. In many cases, the manufacturer receives a brief warning letter citing the regulations violated.

The warning letter is frequently supplemented by a visit from the Priorities Division whose representative explains the regulations to the manufacturer and advises him on record keeping. In more serious instances, the manufacturer is called on to confer with the Compliance Division.

Where audits indicate wilful violations, additional and more detailed investigation is made. The case is formally docketed for a hearing before a WPB Compliance commissioner or is referred to the Department of Justice for criminal action.

WPB reports that a very significant fact about the audits conducted so far is that industry has received them without complaint. Manufacturers have told WPB that audits have resulted in clearing up many points in CMP operation.

The fact is that some manufacturers have requested a WPB audit to discover how their CMP operation is working. WPB has adopted a more or less understanding view and says that it realizes that industry has been confronted by a new, somewhat complex regulation, perhaps not too easy for a manufacturer to put into operation.

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Quarterly Symbol Use Detailed by WPB

Washington

• • • **Use of the quarterly** identification symbol in connection with the placement of orders under CMP was detailed when WPB issued an interpretation to CMP Regulation 1 on Aug. 25.

The quarterly identification need not be shown in placing orders for Class B product components or other production materials (except controlled materials). For example, the identification, "Preference Rating AA-1, Allotment Number W-1" is sufficient for the placement of an order for a Class B product.

The allotment number, however, must be shown on all orders placed with preference ratings under CMP, even though the quarterly identification is not required. Applications for controlled materials must include percentage figures showing how much of their manufacture is being produced for the various claimant agencies. Manufacturers will be unable to indicate it unless allotment numbers are placed on orders.

The quarterly identification (3043, 4043, etc.) indicates the quarter for which an allotment is valid and must be indicated (1) on all authorized controlled material orders, except those being purchased under a blanket symbol such as MRO and SO, and (2) on all allotments. The identification, when it is required, must immediately follow the abbreviated allotment number—for example, W-1-3043.

•

Civilian Allotments Not To Replace War Orders

Washington

• • • **A pattern of the controls** which are to be set up by WPB to protect the manufacture of commodities for civilian consumption has been provided in CMP Bullentin No. 48, just issued by WPB. This bulletin is intended to resolve the conflicts in production schedules of Class A civilian end products. This does not embrace the Class B products, or common components, to which no protection to civilian production is as yet defined.

The protection to the Class A style civilian type end products is limited entirely to an examination of the difficulties by the appropriate industry division of WPB.

The new CMP Bulletin merely makes it clear that allocations to civilians are not to replace any allocation made to war production. Where there arises a conflict in the production schedules of a material producer, that matter must be reported promptly to WPB and it will then be investigated upon its merit.

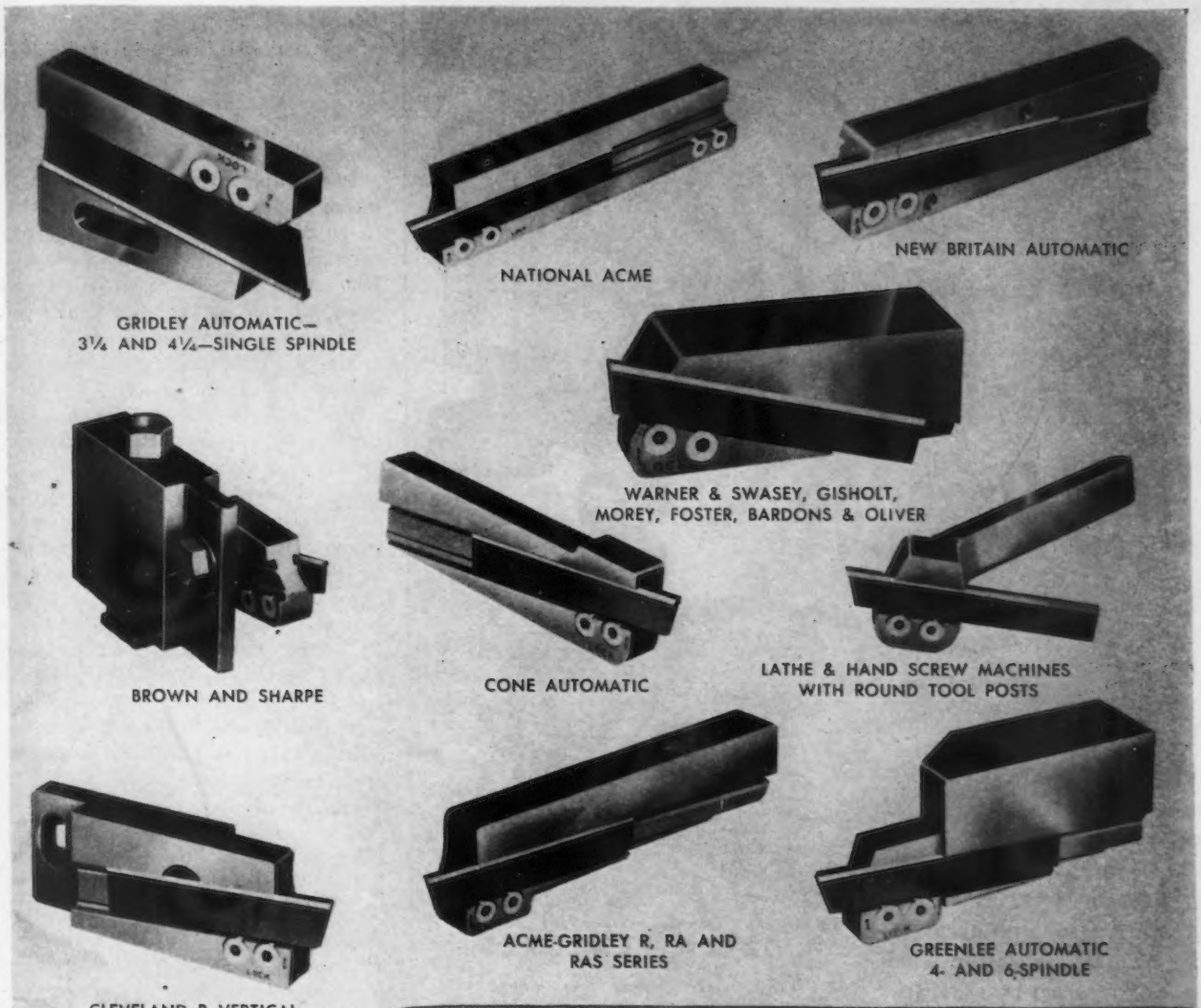
The ruling, of course, only relates to controlled materials-steel, copper and aluminum. The directive to manufacturers and fabricators of products from controlled materials and from materials other than controlled materials must be handled in supplementary rulings by WPB, rulings bearing upon the exercise of priorities.

SRC Termed Headed For Glorious End

Washington

• • • **The Steel Recovery Corp., long the merchants of idle steel inventories, is now said to be headed for liquidation as a government agency which has done its job and outgrown its usefulness. After Sept. 30, SRC will no longer take listings of idle inventories and will begin to wind up its affairs due to the fact that other means of inventory control and disposal have taken over the remaining end of the job, according to WPB. Inventory reports postmarked on or before Sept. 30 will be subject to the government's special higher-than-scrap price.**

EMPIRE TOOL COMPANY'S LUERS PATENTED CUTTING-OFF BLADES AND HOLDERS



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They are today in use in every leading plant in the country where the production of war requirements is dictating speed in cutting-off operations.

Luers Blades eliminate excessive friction, therefore reduce breakdowns. They require less frequent grinding, therefore show longer productive periods.

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M-3B

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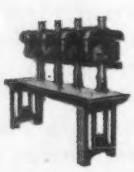
1. Worm-driven power feed operates directly off motor — giving 8 *rates of feed for each spindle speed.*

2. One swift hand motion brings drill down to work — flip of power lever starts power feed.

3. Automatic stop holds depth of holes to close tolerances; spindle returns automatically.

4. *Instant* switching from heavy power-feed operations to sensitive hand drilling.

With one-piece tables: Floor and bench types, single spindle; floor type, 2- and 4-spindle. With sectional tables: Floor type, 3-, 4-, 5-, 6-, and 8-spindle. Slo-Speed or High-Speed No. 2 Morse Taper or ½" Jacobs Chuck spindle.



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Please send me your new catalog giving full details on Delta Power-Feed Drill Presses and your full line of low-cost machine tools.

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CMP Queries Answered On Warehouse Orders

Cleveland

• • • **Authoritative answers** to questions concerning warehouse operation under CMP have been released through the Steel Products Warehouse Association here.

Paragraph (d) (4) of CMP Regulation 4 permits the purchase of up to 10 tons of carbon steel on simple certification. May a manufacturer who receives an allotment for less than 10 tons make additional purchases up to that limit or may he disregard his allotment and simply buy 10 tons on certification?

Yes in both cases. The manufacturer may supplement his allotment or he may disregard it. But if he buys any steel at all under paragraph (d) (4) his total purchases for the quarter may not exceed the limit permitted in that section. For example, he cannot use an allotment of 5 tons and then buy an additional 10 tons on certification. If he had an allotment of 5 tons he could either use his allotment and buy 5 additional tons on certification or disregard his allotment and buy 10 tons on certification. (See enclosed letter from Mr. J. R. Stuart dated Aug. 12)

May material sold on certification under paragraph (d) (4) be replaced?

You have always been able to replace general steel products sold on this type of order. Beginning October 1 you also may replace merchant trade products sold without allotments. Deliveries under paragraph (d) (4) are entered on Line 4 of WPB-2444 (CMP-11) when you order for replacement.

If a warehouse buys distress stock for direct shipment to a customer, should the warehouse charge the price established in Schedule 6 or the price established in Price Regulation 204?

Schedule 6 price would be charged in accordance with Section 1306.159 (k) (1) (iii) of RPS 49 which applies to material not brought into the warehouse. (From a letter written by Donald Kennedy, Aug. 3, 1943).

Distress material is located in Philadelphia. A warehouse arranges for direct shipment to a customer in New York. Applicable basing point for the material is Pittsburgh. Is the delivered price figured with freight from basing point (Pittsburgh) or with freight from present location (Philadelphia)?

The mill base price f.o.b. Pittsburgh is used. (Source: OPA Cleveland Regional Office)

Remember it? The dim vision of masks and gowns, of lights and gleaming things? They were phantom glimpses in a troubled dream, the night your life was saved — fragments of a shining world of science and strange skills . . .

And every appliance, every gleaming instrument — every sterile garment, swab and bandage — every accessory and apparatus there in the room, that night — was the product of machine tools, or was processed on equipment built by machine tools.

From giant hydraulic presses to the finest internal grinding machines, literally hundreds of machine tools played a part, the night your life was saved.

And of all those unseen instruments that helped to save your life that night, none is more basic to the creation of *everything* that affects your life today than the internal grinding machine.

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Springfield, Vermont, U. S. A.

WE HAD A HAND IN IT

Who was responsible for the astounding speed with which industry converted itself into a new production machine? . . . who showed the way to the producing of the great quantities of war materiel in the record time that was demanded by the government? . . . who developed the new tools, dies, and fixtures that were required? . . . and the new processes?

The engineer.

We wish we could tell you how much of this responsibility came to us here at Pioneer . . . how much of the work has been done, and how much is still going on. As you can well imagine, most of the work involved problems much different from any that have ever been encountered before . . . new products were needed, and new ways of making them had to be developed . . . new materials were introduced to displace the old.

You can readily picture what a wealth of engineering data has been accumulating in this procedure; and you can realize, too, that the opportunity to draw on this valuable experience could prove most helpful to your interest.

That opportunity is yours . . . we shall be glad to work with you on your present problems . . . or discuss your future plans with you.

BUY WAR BONDS

ENGINEERS
DESIGNERS
CONSULTANTS

PIONEER ENGINEERING AND MANUFACTURING CO.

19649 JOHN R
DETROIT, MICH.

NEWS OF INDUSTRY

A warehouse wishes to buy distressed stock in a quantity in excess of 40,000 lb. and have the material shipped direct to another warehouse. What certification is used? Do any quantity restrictions apply?

Mr. J. R. Stuart replied to this question in his letter of July 27. He said:

"A warehouse consummating a sale of material, properly defined as 'excess or idle inventory' under Priorities Regulation No. 13, is privileged to act as an agent following the provisions of Paragraph (e) of General Preference Order M-21-b-1. This requires the transposition of the certification received by such warehouse to the supplier of the material involved.

"If the warehouse accepting delivery is properly qualified under the Regulations to purchase distressed stock then the certification he would use would be that as required under Paragraph (d) of the Regulation, which certification would then be passed on to the supplier of the material.

"Such a transaction as described is not considered a delivery subject to the terms of CMP Regulation No. 4. Consequently there would be no quantity restriction involved. Further, since it is a purchase from distressed stock it would not be charged as applicable against the base tonnage of the receiving warehouse."

The same principles apply if the customer is not another warehouse. In a letter dated Aug. 3, Mr. Stuart said:

"A warehouse which purchases distressed stock for direct shipment to a customer shall specify delivery to a point other than its warehouse and shall copy on his own purchase order, the endorsement made to it by its customer including the customer's name in accordance with CMP Regulation Number 1, or other applicable Regulations or Orders."

If a warehouse orders some material from another warehouse for direct shipment to a customer, must the order placed by the warehouse making the purchase contain the name and endorsement of the customer to whom delivery will be made?

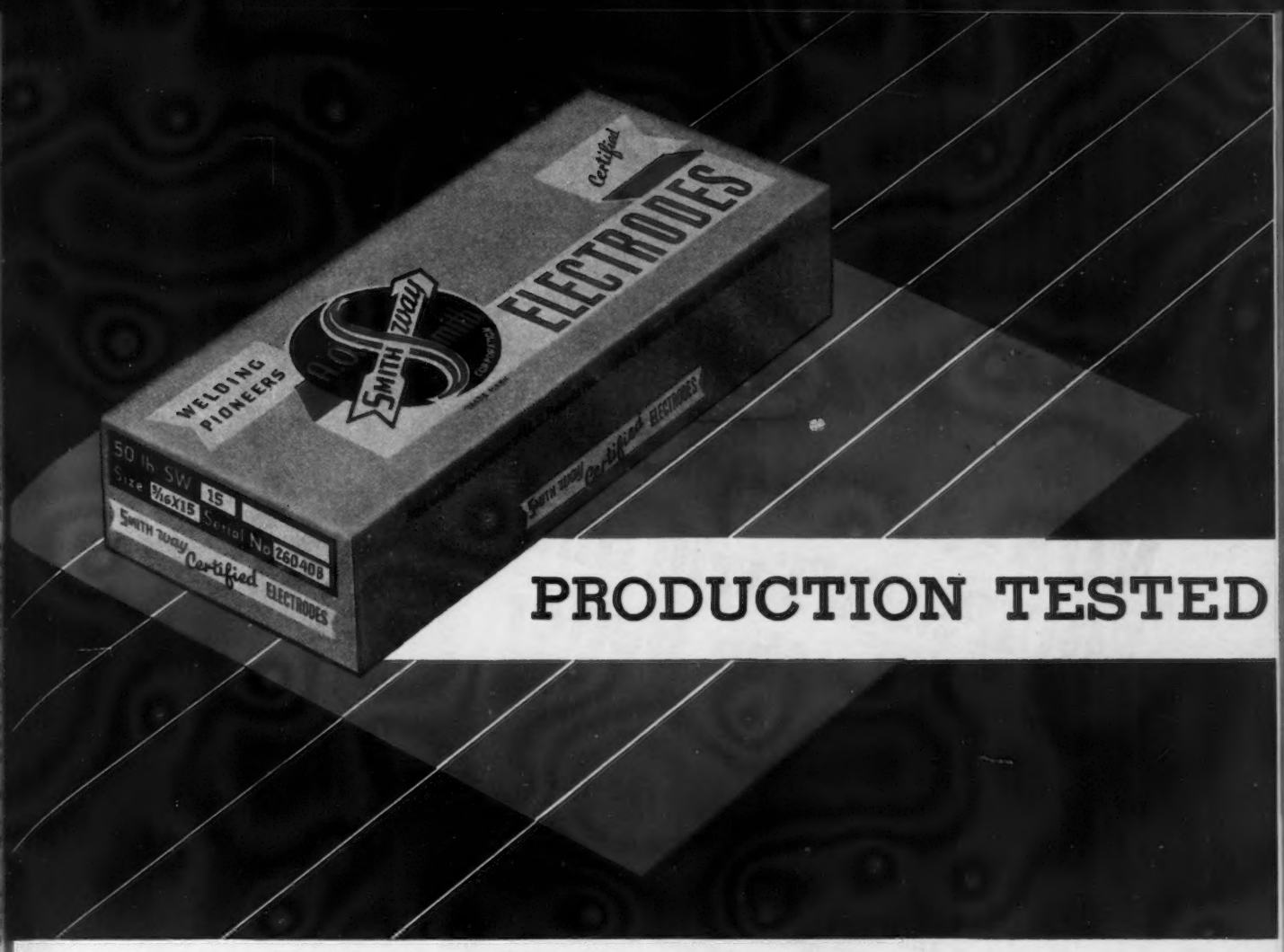
Yes. The transaction is handled in accordance with Paragraph (e) of Order M-21-b-1 or Paragraph (f) of Order M-21-b-2.

What price should the ultimate customer be charged on the sale in Question 6. The price established in Schedule 49 or the price established in Schedule 6?

The Schedule 49 price applies. A

COMING EVENTS

Sept. 28 to 30—Iron and Steel Engineers convention, Pittsburgh.
Oct. 5, 6—Gray Iron Founders' Society, Cincinnati.
Oct. 5, 6, 7—National Safety Congress, Chicago.
Oct. 11, 12—American Society of Tool Engineers, Indianapolis.
Oct. 13 to 16—The Electrochemical Society, Inc., New York.
Oct. 14, 15—American Machine Tool Distributors' Association, Montebello, P. Q., Canada.
Oct. 18 to 22—National Metal Congress and Exposition, Chicago.



PRODUCTION TESTED

SMITHway Certified Welding Electrodes are products of laboratory and shop control unparalleled in the electrode manufacturing business. And that's important. No electrodes can be as good as SMITHway electrodes unless manufactured under equally strict quality control and unless hundreds of thousands of dollars have been invested in research.

But Smith goes even farther than that. SMITHway Electrodes are *production tested* in our own welding plants, which are among the largest in the world. With us, the quality of electrodes is vital to the success of *everything we do!* To insure the quality, operating characteristics, and uniformity we *must* have, we manufacture our own electrodes. We also offer them to others who do welding. In so doing, we offer electrodes that have *proved* their ability to produce *better welding results* at *lower welding cost*— and proved it under actual shop conditions. We think SMITHway Certified Welding Electrodes can do as much in your plants.

Mild Steel . . . High Tensile . . . and Stainless Steel

WELDING ELECTRODES

made by welders . . . for welders

***SMITHway Arc Welder** eliminates objectionable arc blow; speeds production.*

***SMITHway Welding Monitor** trains better welders faster.*

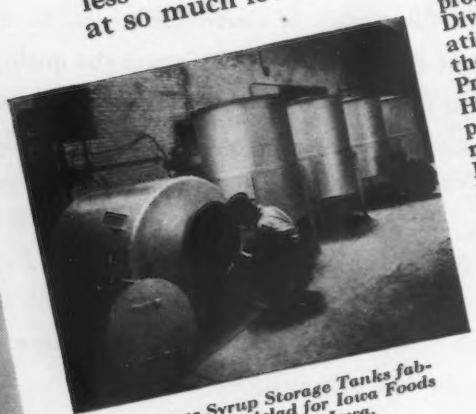
A. O. SMITH Corporation

MILWAUKEE • WISCONSIN • HOUSTON • TEXAS

Only NON-CORRODING EQUIPMENT will find a Place in the Better Plants of the Future

Plan now with IngAclad for the competitive days ahead

You know the advantages of stainless steel equipment, but you may not know that IngAclad Stainless-Clad Steel gives you perfect stainless service at so much lower cost.



Beverage Syrup Storage Tanks fabricated of IngAclad for Iowa Foods Co., Iowa City, Iowa.

For more than 10 years, this product of the Ingersoll Steel Division of Borg-Warner Corporation has served satisfactorily the leaders in many of America's Process Industries. Since Pearl Harbor practically all IngAclad production has gone into equipment for the Armed Services. Here it has served well, both by conserving large quantities of vital alloys and by providing non-corrosive equipment at lower cost.

Investigate IngAclad now. See how it can be widely used in your plant to improve appearance, to protect your product, and to lower manufacturing costs. Write for the Free IngAclad Manual of Welding and Fabricating Procedures.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
310 South Michigan Avenue • Chicago, Illinois

INGACLAD
STAINLESS-CLAD STEEL

"A Borg-Warner Product"

PLANTS:
Chicago, Ill.;
New Castle, Ind.;
Kalamazoo, Mich.

We Also Produce INGERSOLL Solid Stainless Steels

letter from Donald Kennedy dat Aug. 5, 1943, states:

"In the instance involved, the war house making the purchase of th material for direct shipment to a cu tomer acts as a broker, and the ma mum price which he would be permi ted to charge the customer for th material would be the same price th his source of supply would be permi ted to charge. If his purchase wa made from another warehouse, the the maximum price which the buyi warehouse would be permitted charge would be the same price th the selling warehouse was permitt to charge."

Must an authorized controlled mat rial order placed with a warehou designate the actual month in whi delivery is required?

Yes. CMP Regulation 1 provid that orders for controlled materia must indicate the month delivery required, for example, "July 194 In a letter from J. R. Stuart dat August 4, it is stated that "An ord which does not contain a designati of the delivery month required is n

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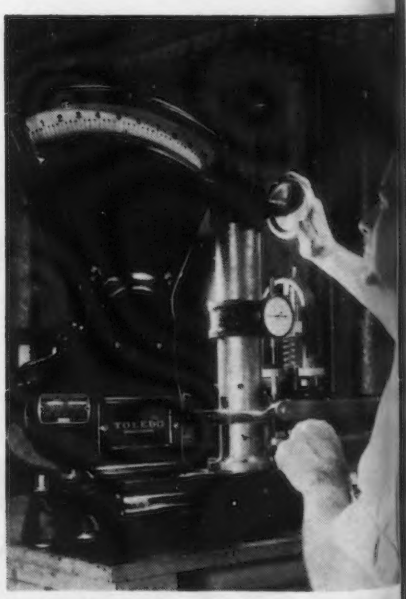
STORE SCALE USED AS SPRIN TESTER: A converted store-typ scale is used for testing sma springs at the chemistry labor tories of Westinghouse Electri East Pittsburgh. The scale will ac commodate tension springs with minimum length of 9/16 in. an compression springs with a max mum length of 3 in. The load rang is from 0 to 10 lb. on the pointe scale, with a graduated beam o 10 lb. and a blank beam of 10 lb. making the working range 30 lb. A dial gage measures tension o compression, and a micrometer at tached to the moving head test springs at fixed lengths.



Speeds Material Handling ...for Victory!

RE-POWER with READY-POWER

Gas-Electric Power Plant for Electric Truck Operation

THE POWER THAT MAKES TRUCKS DO MORE

R-P power for electric truck operation, handles materials at lowest cost per ton.

Baker Fork Truck

Yale Crane Truck

Hi-Lift Truck

Continuous Power

INDUSTRY TODAY needs Ready-Power more than ever before to handle materials faster, more economically, and to speed up production to the wartime pitch. Ready-Power equipped trucks handle more loads per hour, per day, per year, than the same equipment battery powered. Ready-Power (Gas-Electric) Units convert ordinary trucks into trucks with higher peak performance because of the continuous flow of power.

Since 1924, thousands of R-P Units have been adapted by industry to their toughest jobs.

R-P replaces storage batteries and charging equipment—makes the electric truck completely mobile—free from limitations imposed by use of batteries for truck power.

Elwell-Parker Truck Steel Handling

Peak Performance

The Ready-Power Company *does not make industrial trucks*-but supplies the gas-electric power plants that make electric trucks do more work. Truck manufacturers furnish Ready-Power equipment on new trucks at your request—or you can get Ready-Power units to replace batteries now in operation, direct from The Ready-Power Company.

Automatic Platform Truck

R-P power plants are good for the life of the truck—handle the loads quickly.

Write for information, mentioning type of new truck contemplated or make and type of trucks now being operated.

Clark Tructractor

Mercury Tractor

THE READY-POWER CO.

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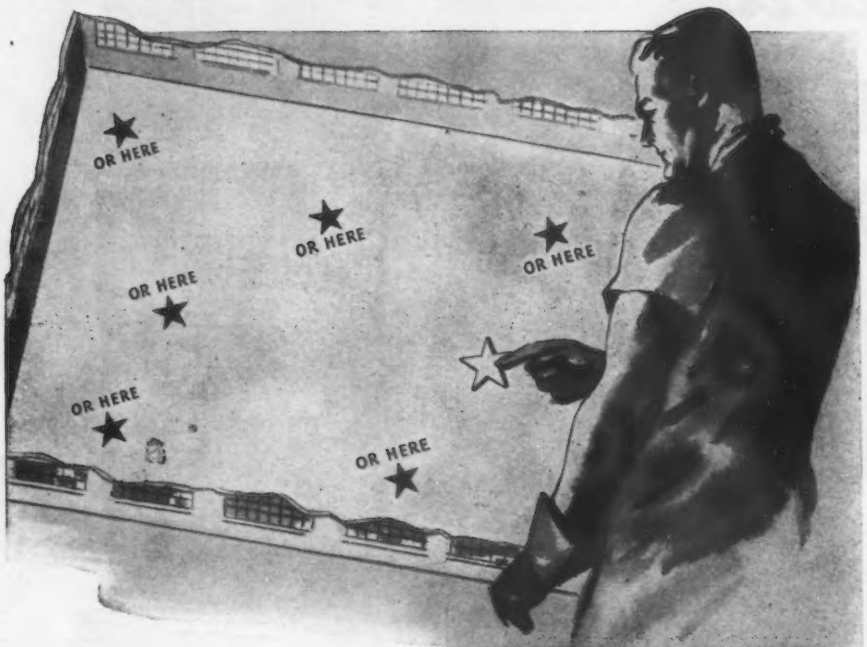
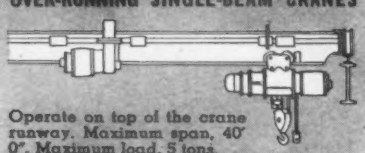
Move it over *Here*

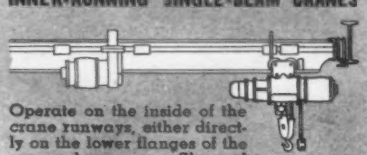


OVER-RUNNING SINGLE-BEAM CRANES



Operate on top of the crane runway. Maximum span, 40' 0". Maximum load, 5 tons.

INNER-RUNNING SINGLE-BEAM CRANES



Operate on the inside of the crane runways, either directly on the lower flanges of the runway beams, or on Shepard Track which has been clamped to the lower runway flanges. Maximum span, 40' 0". Maximum load, 5 tons.

UNDER-RUNNING SINGLE-BEAM CRANES

Operate on bottom flange of runway to which Shepard Track has been clamped. Especially adapted to low head-room areas. Crane runway can be hung direct from roof trusses, eliminating supporting columns, saving vital materials, time and expense. Maximum span, 40' 0". Maximum load, 10 tons.

No extra time for re-handling here. A Shepard Niles Single-Beam Crane covers every square foot of the bay with vertical lifts. Side pulling and dragging of the load is eliminated. The crane covers the length of the bay, while the hoisting unit covers the width. Thus, fast, accurate and economical handling of materials is afforded through Single-Beam Cranes, where conditions do not require, nor clearances permit, installation of a Double-Beam Crane.

Available in over-running, inner-running or under-running construction—with push button, or pendent rope control. Handle all loads from ¼ to 10 tons.

Call in our nearest representative. He will gladly cooperate with you in determining where important materials-handling economies can be made.

Write for Bulletin 130

Shepard Niles

CRANE & HOIST CORPORATION

356 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

strictly an 'authorized controlled material order'."

Are any S-3 allotments valid during the third quarter?

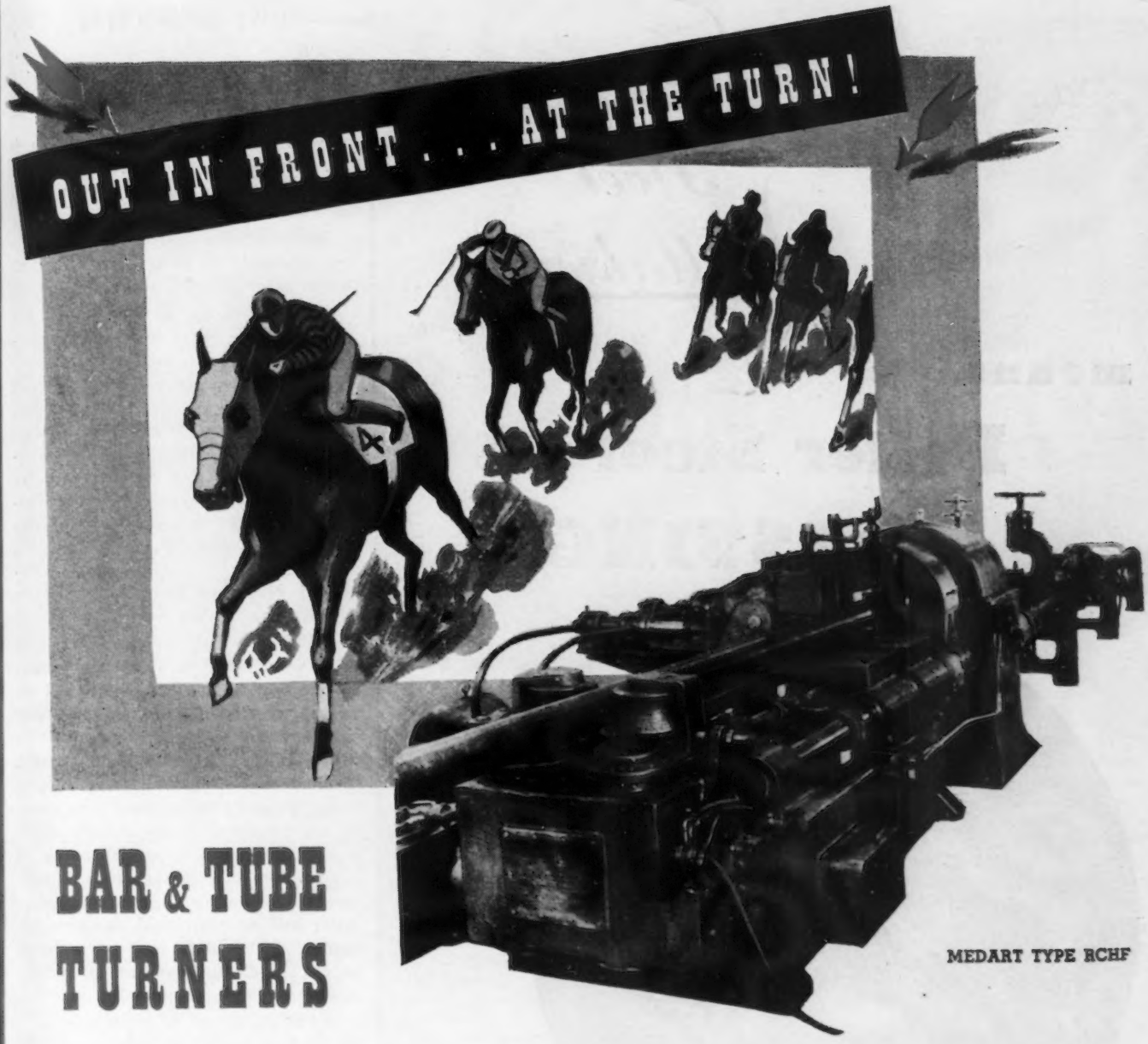
Yes. No S-3 allotments have actually been issued during this quarter but some advance allotments for third and fourth quarter were issued before June 30. While new symbols to replace S-3 allotments should have been assigned, it is likely that the new symbols have not yet reached all consumers. Therefore, warehouses will probably receive a small number of S-3 orders during this quarter. In his letter of July 31 Mr. Stuart explains these facts and adds that he "would not discourage warehouses from accepting such orders."

If a warehouse receives in July material ordered from a mill for June delivery, how shall it report the tonnage on Form PD-83 in order to avoid confusion in the Warehouse Branch Control Section?

"It is recommended that wherever tonnage is received in a subsequent quarter because of the mill having exercised its privilege to ship 30 days after the last day of the month authorized, that the warehouse in reporting on their PD-83, attach a letter explaining the receipt of the quantity involved. The Warehouse

---

LARGEST V-BELT DRIVE: Main drive from the 1500 hp. Corliss engine to lineshaft at the flour mill of the Standard-Tilton Milling Co., Alton, Ill., is believed to be the largest V-belt drive in the world. There are 21 Goodrich "G" section V-belts 76 ft. long; with an 18 ft. engine sheave, 5 ft. driven sheave and 5 ft. flat idler pulley.



MEDART TYPE RCHF

BAR & TUBE TURNERS

★ CONTINUOUS
★ AUTOMATIC
★ CENTERLESS

From a long line of Medart bar turning machines! Continuous, automatic feeding gives you high production unequalled by any other type turning machine! For rough peeling or finished precision conditioning. Medart Centerless Bar Turners will turn bars and tubes at maximum rate obtainable from any present day cutting tools. The machines are very flexible. May be used with one or two cutterheads, with one or up to eighteen tools in each head.

Manufacturing Engineers of Complete Transmission Equipment and Specialized Machinery

MEDART

THE MEDART COMPANY
3500 DE KALB ST., ST. LOUIS, MO.

Better Steel Making

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Better Steel CASTINGS

A "STRONG-CAST" CASTING *is one of undivided responsibility. Quality is rigidly guarded every step of the way—from watchful chemical and temperature laboratory-checks of each heat, to the careful annealing and cleaning operations on the finished casting.*

This quality control, plus modern steel casting equipment, such as our 25-ton, acid bottom, oil fired, open hearth furnace, are responsible for the high regard in which Strong Steel Castings are held in many vital industries.

It will pay you, in the interest of saving time, trouble and expense to become better acquainted with what Strong has to offer.

STRONG IN NAME
STRONG IN FACT

STRONG STEEL FOUNDRY COMPANY, BUFFALO, N.Y.

Strong

TENSILE STRENGTH · ELONGATION

Branch will take that into consideration when examining the PD-83 reports."

Note that Mr. Stuart's advice is particularly important when material ordered for one quarter is delivered in another quarter.

May an order bearing a third quarter allotment be placed with a warehouse after the end of third quarter?

No. Hereafter a warehouse may not accept an order bearing the allotment number of a quarter which has ended. It may, however, ship material previously ordered up to thirty days following the end of quarter. In other words, an order bearing a third quarter allotment may not be accepted after Sept. 30, but such an order accepted for that date may be filled any time before Oct. 30. (Source: Mr. Stuart's letter dated July 26. Information contained in that letter came too late to be applicable to second quarter allotments placed in July.)

A warehouse receives five orders in one day from a customer. All the orders specify delivery in the same month; the aggregate tonnage involved is approximately 75,000 pounds. Each order is for a slightly different item; separate orders have been placed in accordance with the custom of the buyer and not with any intention of artificially subdividing his requirements. Assuming that no individual order and no individual shipment exceeds 25,000 pounds, may a warehouse accept these orders and make delivery at the Schedule 49 price?

WPB approval is unnecessary if the orders have not been artificially subdivided. However, OPA acts on the principle that all orders received in one day from one customer should be combined to determine quantity. Since the total of the five orders exceeds 40,000 pounds, the sale must be made at Schedule 6 prices unless OPA establishes a special price for the transaction. However, OPA will not establish an individual price without a WPB certification. Therefore, unless the mill price is acceptable, WPB approval should be secured and then OPA will set a price. (Source: Letter from J. R. Stuart dated Aug. 12; letter from Donald Kennedy dated Aug. 3.)

A broker places an order with a warehouse using his customer's allotment number. May the warehouse ship the material to the broker?

A broker would not be permitted to accept delivery. (Source: Mr. Stuart's letter of Aug. 12.)

ONLY DELIVERED HORSEPOWER COUNTS

When you hook up your motors to production machines with Matched-Quality D-V Drives you deliver a knock-out punch to "power absenteeism." You are putting *all* the power into production for stronger Victory drives on battle fronts.

A well engineered team, Dodge D-V Belts and D-V Sheaves go "all out" *together*. Their matched-quality construction puts *all* the power to work. Special tooling and precision gauges insure uniform accuracy. Each D-V *Sheave* is precision-grooved to insure proper seating of each belt. With D-V Matched-Quality drives you are sure of:

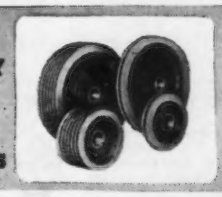
✓ Uniform seating of each individual D-V Belt . . . ✓ no sag, slip or uneven belt pull . . . ✓ every individual D-V Belt does its full share of the work . . . ✓ less wear on belts, sheaves and other transmission parts, thus conserving critical materials and reducing operating costs.

Dodge D-V Drives assure clean, silent, low-cost operation. ✓ No lubrication required . . . ✓ no danger of oil damage to product . . . ✓ no adjustments required . . . ✓ maintenance is reduced to a minimum . . . ✓ peak power transmission efficiency and economy are certain!

In the complete line of Dodge D-V Drives, bearings, clutches, pulleys and other modern power transmission units, your local Dodge Distributor offers "The Right Drive for Every Job." Contact him . . . he is prepared to render valuable service . . . or write to

DODGE MANUFACTURING CORPORATION
Mishawaka, Indiana, U. S. A.

DODGE VICTORY WOOD *Matched* **D-V SHEAVES**

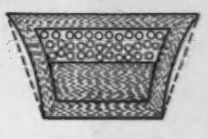


DODGE CAST IRON PRECISION *Matched* **D-V SHEAVES**

DODGE
MISHAWAKA

THROW ALL YOUR SCRAP INTO THE FIGHT! BUY MORE WAR BONDS!

THE RIGHT DRIVE FOR EVERY JOB



Dodge D-V Belts have concave sidewalls. When flexing around sheave, the sidewalls flatten out straight, thus providing full contact between the V-Belt sides and the sheave groove. This insures even pull, eliminates slippage, prevents power-loss.

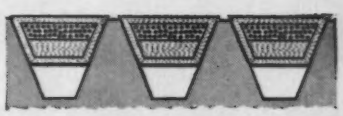
★

Belts with flat sidewalls will bulge in center when flexing around sheave, thus making only partial contact with the sides of the sheave groove.

★

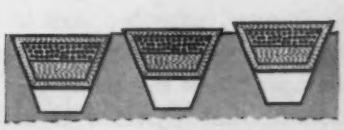
IMPORTANT NOTE: It takes D-V Sheaves and D-V Belts to give you a Dodge "Matched-Quality" D-V Drive.

GET THIS



Precision machining of D-V Sheaves insures smooth grooves of uniform pitch diameter which means long belt life, accurate seating of belts, even pull, full power delivered to work.

NOT THIS



This is what happens when sheave dimensions are not uniform. Belts can't seat properly and pull unevenly. Loafing belts mean lost power, shorter belt life.

Typical installation

PUT *ALL* YOUR POWER IN THE JOB

RUTHMAN

Gusher Coolant Pumps

THE OUTSTANDING COOLANT PUMP TODAY

FEATURES

1 precision ball bearing

2 standard interchangeable stator

3 precision ball bearing

4 rigid one-piece shaft

5 removing these screws permits lifting pump and motor assembly for inspection.

6-7 twin intakes are automatically cleansed when pump is throttled

8 internal louvers and revolving cup disc protect motor

9 conduct wiring connection

10 centrifugal lock nut and seal prevent moisture from reaching bearing

11 double acting impeller

12 heavy mounting flange cast in one piece with impeller housing

13 internal discharge thru center of intake eliminates outside piping

Look over these features and you will see some of the reasons behind the excellent performance of Ruthman Gusher Coolant Pumps. When the pump is new you get flexibility and range of control that provides a trickle or a gusher stream instantly without priming.

And more important, when the pump becomes several years old you will still get the same satisfactory service because Ruthman Pumps are noted for freedom from maintenance attention. Keep cool with Ruthman Gusher Coolant Pumps.

The RUTHMAN MACHINERY COMPANY

CINCINNATI, OHIO

NEWS OF INDUSTRY

WPB Regional Office Assistance Outlined

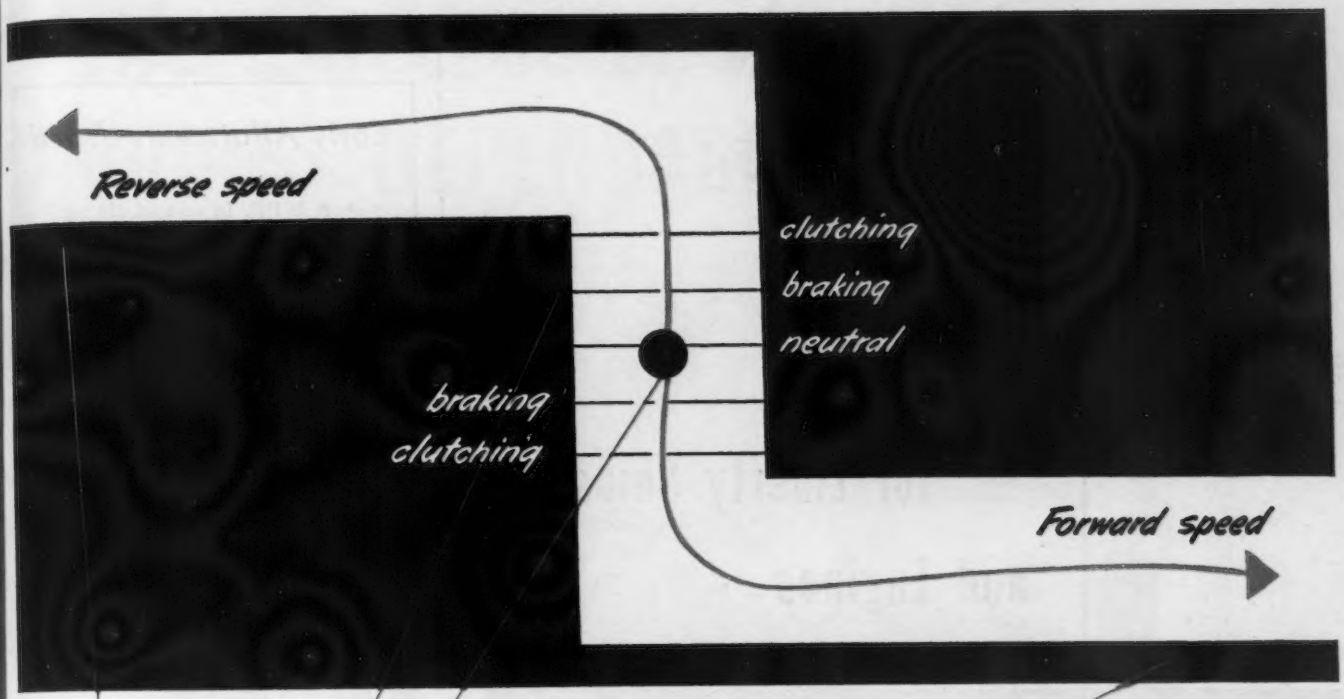
• • • WPB regional offices offer war plant operators and essential producers with a wide variety of assistance in solving production problems of all kinds from appealing a restrictive clause of an order to finding steel or machine tools need by a vital operation. To clarify the functions of the regional organizations to those who have not made full use of these facilities, the WPB has issued a brief description of the specialized departments to be found in many regional offices. These departments vary somewhat according to local needs but the following descriptive list typifies the organization placed at manufacturers' disposal without charge.

Priorities Department

When you require advice and assistance on priority and controlled materials problems, write, telephone, or have individual conferences or group meetings with this department. Preference ratings are granted for emergency repairs where break-downs have occurred. Preference ratings are granted for limited quantities of critical materials for the completion of war contracts or to prevent imminent stoppages of production. Ratings are granted on certain PD-1A applications and certain PD-200 applications. Ratings are also granted for conversion from fuel oil to solid fuel. Defense housing projects are provided with priorities assistance.

Redistribution Division

Acts as a procurement agency for locating urgently needed material, equipment, tools, and machinery. Assists holders of idle, frozen, or excess material to move this material into the war effort. Maintains local and national inventories of critical materials of all kinds, the timely redistri-



Check your control problems

along these lines

In almost every plant . . . and in many mechanical products . . . there's a place where a simple, dependable, and economical remote control system would help to boost production, or add salability. These are the places that W·A·B Remote Control Systems are designed to fill.

These controls place complete command of any series or sequence of operations directly under the thumb of the operator. Just as an example, consider this graphic indication of an engine control cycle used on shipboard.

All engine operations involved in maneuvering the ship—speed control, braking, clutching or reversing—are governed by a simple movement of the control handle.

It is impossible for the operator to alter the order of these operations and so damage the equipment . . . yet the timing is completely under his control.

One of our representatives will be glad to discuss your control problems with you, and recommend a solution. In many instances, no special equipment is required; standard, immediately available, "off the shelf" W·A·B devices can do the job. Write, wire or phone.

Westinghouse Air Brake Company

INDUSTRIAL DIVISION

General Offices: Wilmerding, Pa.

74 Years of Pneumatic Control Experience

W·A·B

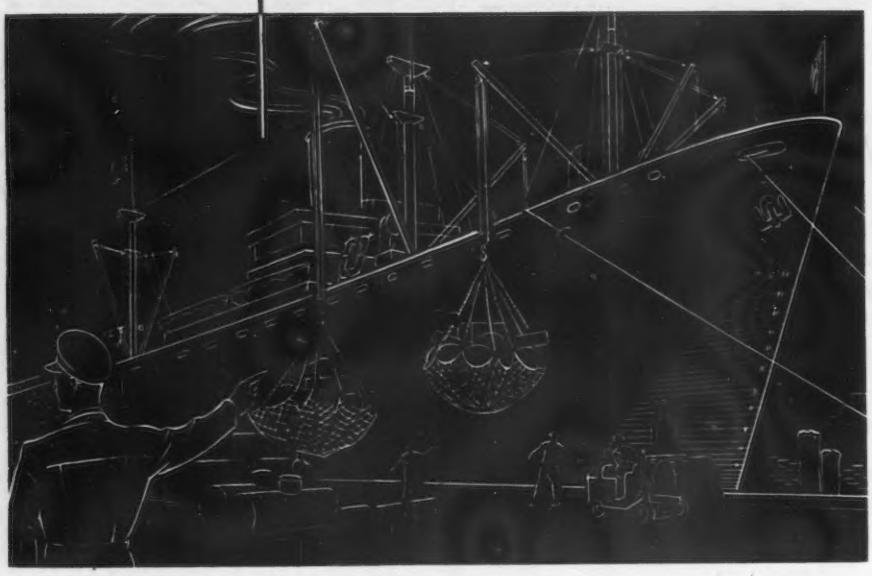
PNEUMATIC
PNEUMATIC-ELECTRIC
PNEUMATIC-HYDRAULIC

remote control systems

STANDARD

makes forgings

for Liberty Ships and Engines



Steel forgings by Standard are working for America in the wartime cargo vessels of today, and will continue to serve in maritime tasks of tomorrow. For it is the acid open hearth steel that Standard makes . . . the rigid, scientific control of each manufacturing process . . . the skill of experienced personnel . . . that produces the high quality of steel forging that will render satisfactory future service after having "delivered the goods" today.

STANDARD STEEL WORKS

DIVISION OF
THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

FORGINGS • CASTINGS • WELDLESS RINGS • STEEL WHEELS

Early Allotments Urged

Washington

• • • WPB, in one of its periodic admonitions, again requests prime and secondary consumers of controlled materials to make allotments to their suppliers as soon as possible.

This warning which came from the CMP Division last week also applies to advance allotments. CMP officials pointed out that if additional allotments are required, customary of materials should be requested to furnish them.

bution of which contributes to satisfactory completion of war production contracts on schedule.

Salvage Department

Locates, stimulates the collection of, and arranges for movement to consumers and manufacturers of all scrap materials, iron, ferrous and non-ferrous, tin, fats, and waste materials. Stimulates the collection of scrap from industry, government units, public utilities, homes, farms, and small shops.

Appeals Department

If L and M orders work a hardship on your business, consult this department and receive assistance in preparing appeals for relief from the provisions of these orders.

Compliance Department

Enforces various WPB orders and regulations.

Financial Advisory Service

Prime and subcontractors engaged in war production requiring additional working capital or financial assistance should consult this department.

Governmental Division

Takes care of needs of federal, state, and local government units, including schools, churches, hospitals, penal institutions in construction projects of all kinds by collecting information, furnishing advice, assisting in obtaining preference ratings. Seeks to bring all such projects under Governmental Requirements Plan.

Production Service Department

Assists manufacturers in attaining maximum production and offers engineering advice for tool and conversion problems. Maintain up to date records of idle hours, location and condition of available critical tools.

The Success of his Mission
REQUIRES DEPENDABLE AMMUNITION

For Greater Assurance
Steel Shell Cases and Ordnance Parts Should be Deoxidized with Deoxidine

The safe, effective, economical way to prepare steel shell cases, shells and other steel ordnance parts for the protective finish.

The substitution of steel shell cases for brass is one of the major accomplishments of American ingenuity in the present war. Details of drawing, annealing, finishing, etc., have been successfully worked out in plants and Government Arsenals where these problems were not entirely new.

The need for unusual protection of the finished shell case against rust in overseas shipment and use under severe climatic conditions, however, presents a new and serious problem to many manufacturers.

The best finishes available fail under severe exposure conditions if the surface on which they are applied is not clean chemically as well as mechanically, free from invisible rusters as well as visible rust. The DEOXIDINE process is admirably suited to the proper preparation of the metal to receive and hold a durable protective finish so necessary for "successful missions." The often overlooked, though important detail of proper rinsing in slightly acid solutions is accomplished with DEOXYLYTE as a part of the DEOXIDINE process.

The success of the steel shell case and all other ordnance parts in combat will depend upon close adherence to such seemingly unimportant details.

DEOXIDINE meets U. S. Ordnance Department requirements in removing rust and neutralizing rust producers before protective finishes are applied.

ACP will help in guiding you in the proper preparation of steel shell cases, shells and any other ordnance parts to receive the specification finish. Descriptive literature will be sent on request.

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E-9

A war production **MUST:**

ENGINEERED REBUILDING

keeps machine tools running!

The Arsenal of Democracy is now tooled up and producing for all it's worth. From here on in . . . *existing* plants and machine tools must turn out the matériel for final victory. "Making the most of what we have," as a result, becomes the order of the day, and Simmons is prepared, as it has been ever since this war first threatened, to help metal-working industries over their machine tool obstacles by *Engineered Rebuilding.*

Today more than ever, when machine tools break down they must be speedily and efficiently rebuilt. Simmons has the experience and facilities to solve your rebuilding problem quickly. Ask today for full details. Simmons Machine Tool Corporation, North Broadway, Albany 1, N. Y.

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ABOVE: Building up a worn steel crankshaft. RIGHT: A skilled mechanic develops a perfect bearing on the surface of a turret head's ways by hand scraping.

SIMMONS ENGINEERED *Machine Tool* REBUILDING

Canadian Steel Production to Make New Highs in Last Half

Toronto

• • • **Canadian iron** and steel production has started an upward climb which is expected to carry it well above the total for the first half of this year and to new high peaks. The upturn in production together with curtailment in demand in some quarters has been reflected in a slowing down in imports from the United States. Large tonnages of plate and some sheets still are coming into this country from across the line, but domestic production of carbon and alloy bars now is said to be sufficient to meet all requirements of the Canadian war industry with some left over for essential civilian use. The Steel Co. of Canada Ltd., has added 8,000 tons per month to its ingot capacity with the completion of its new electric furnace, while other expansions at the various mills throughout eastern Canada is having further stimulating effect on steel production. While Algoma Steel Corp., Sault Ste. Marie, has not reported blowing in of its new 1,000 tons blast furnace, company officials state that it is about ready to go into production, and will be an important factor in supplying pig iron during the coming winter. Dominion Steel & Coal Corp., Ltd., Sydney, N.S., blew in its new stack about a month ago.

New order placing in the Canadian steel markets has been steadily declining since the first of the month, and most of the fresh buying has been in small tonnage lots. This is due to the fact that most consumers had previously covered and what business now appearing is mostly special grades or fill in tonnages. Demand for steel dropped below the average during the past month, when many plants working on war contracts closed for a week to give workers a holiday. Another factor is that a number of companies that formerly were pushing production on defensive weapons are in process of retooling for new lines of production of an offensive nature and have not yet gone into operation on new schedules.

The change-over in war production has left many large war contractors with big surplus stocks of steel that was rolled under British specifications that are not adaptable to the new lines of production that are now going into effect. Thousands of tons of this type of material are in stock piles in war plants and cannot be used in new operating schedules. Much of this

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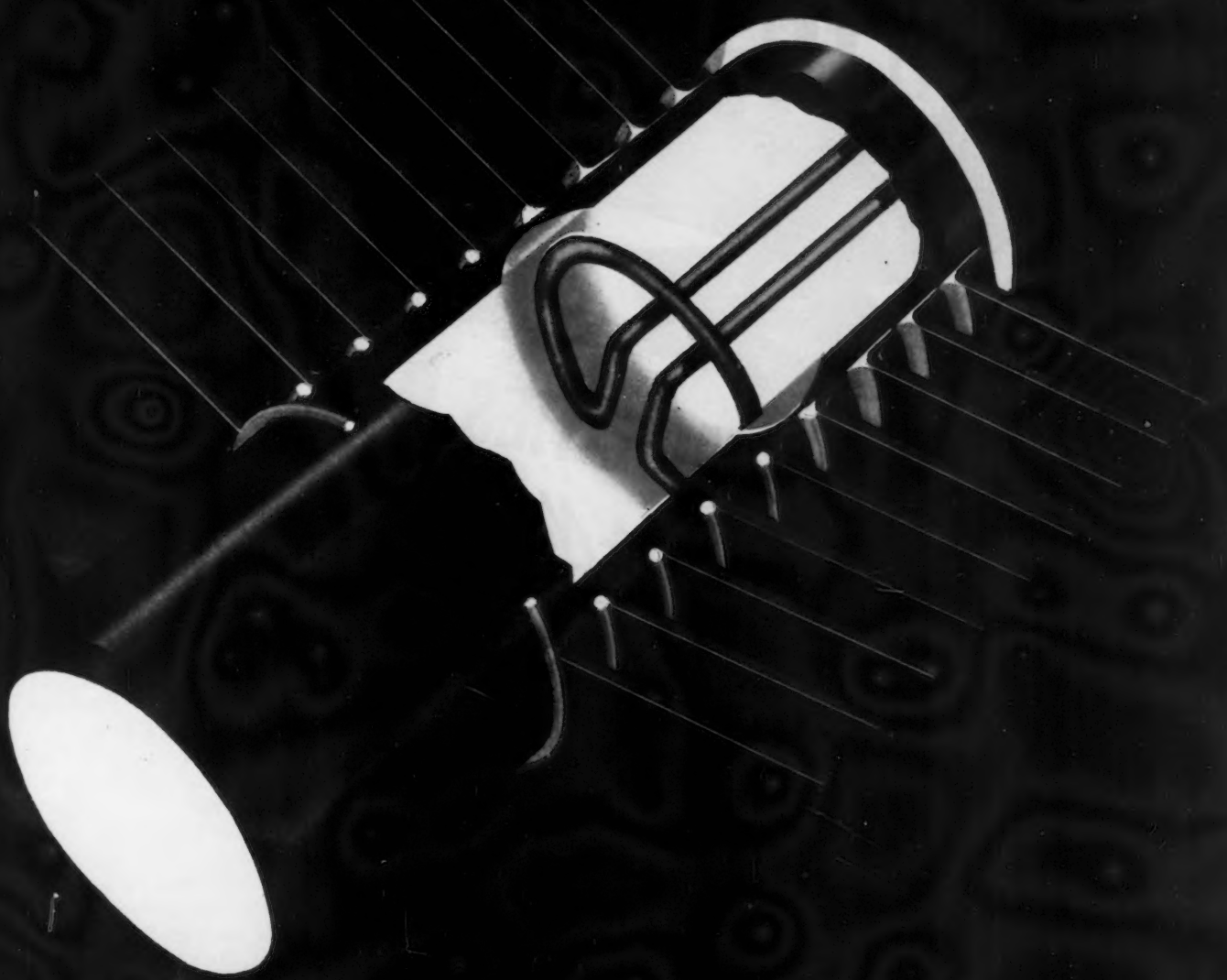

the inside story of a tough brazing job

One of the more difficult brazing jobs has been that of multiple fins encompassing a hollow cylindrical core . . . the heat required for the braze frequently distorting the fins. Induction Heating's solution to the problem is to wind wire solder around the fluxed core so that it lies against the joints formed by core and fins . . . and simply pass a coil through the cylinder. As the coil passes through, it heats the cylinder by induction, and this, in turn, heats each fin by conduction, forming a perfect, clean braze without affecting the body of the fin in any way.

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Whatever your particular heat-treating problem, our technical staff can and will help you. Call them in . . . and learn how progressive plants of every kind are achieving high-speed, uniform production with this most modern method.

Induction Heating Data Sheets are available for you upon request

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One of Wyckoff's three high-efficiency heat-treating furnaces.

Accurate regulation and control features Wyckoff's annealing practice.

The unexcelled Wyckoff heat-treating equipment that today serves Uncle Sam's needs 100%, will be ready and "fit as a fiddle" to serve *you* after the war.

Then, when you need to retain the specific *physical properties* and machinability ratios of cold drawn steel you can safely entrust the job to Wyckoff. The Reason? Wyckoff annealing, quenching and tempering facilities are designed *especially* to furnish these characteristics in cold drawn steels.

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material is expected to be made available to essential civilian consumers and the remainder may be returned to the steel mills for scrap. At the moment, however, no definite steps are being taken to dispose of these large stocks of steel.

British Taxes Take 40% In 1942; American Take 27%

New York

• • • **Britons paid** out forty cents of every dollar of national income for taxes in 1942, while Americans paid out twenty-seven cents, according to a comparison of tax-income ratios in the two countries made by the division of industrial economics, National Industrial Conference Board.

If we had paid out as large a share of our national income in taxes as the British did last year, our total tax bill would have been boosted $17 billion, or half again as much as it actually totaled.

Our taxes amounted to $250 per capita last year. To have matched the British taxpayer's performance of 40% of income, we would have had to pay out $375 per capita.

The relative increase in tax payments has been strikingly similar as each country became more and more deeply involved in the war. Thus in the first year of conflict, 31 per cent of the income of the United Kingdom went for taxes, 38 per cent in the second year, and 40 per cent in the third year. In our country, 27 per cent was absorbed by taxes in our first year in the war, and the share in our second year may approach 33 per cent. With the same relative rate of increase as in Britain, 35 per cent of our income would go for taxes in 1943, as against the third the government is expected to take this year.

Steel Mission Ready To Report World Condition

Washington

• • • **High officials of** WPB were told the adventures of a British-American round-the-world steel mission on Aug. 18 by Sir John Duncanson and Earl Emerson, president of Armco International Steel Co. They traveled 48,000 miles and visited steel plants in Australia, New Zealand, New Caledonia, India, Union of South Africa and the Middle East.

The British members will present a report of steelmaking conditions found by the mission to the Dominion Council in London soon.

2¢ WOULD HAVE PREVENTED THIS SHUT DOWN

. . . . 2c MORE FOR A NON-RUSTING BOLT IN A VITAL PART

CAN A COUPLE OF PENNIES more per bolt save thousands of dollars? Indeed they can . . . and Harper Fastenings are proving it every day. Saving huge sums by preventing hidden destruction by rust and corrosion. They help war production machinery to stand up under today's grueling speed and overtime.

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4320 STOCK ITEMS . . . of bolts, nuts, screws, washers, rivets and accessories in the non-ferrous and stainless alloys.

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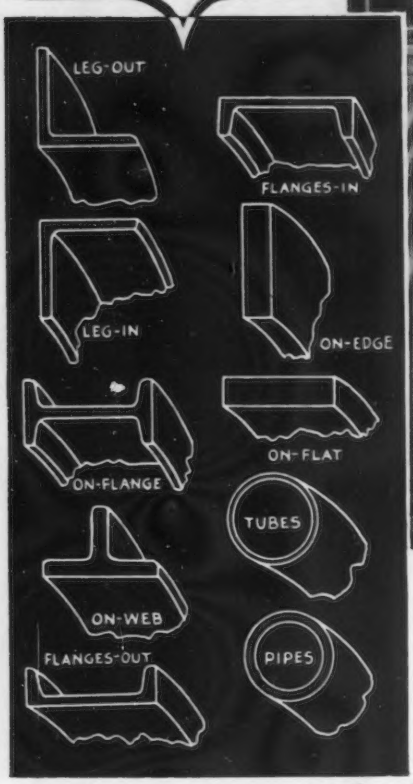

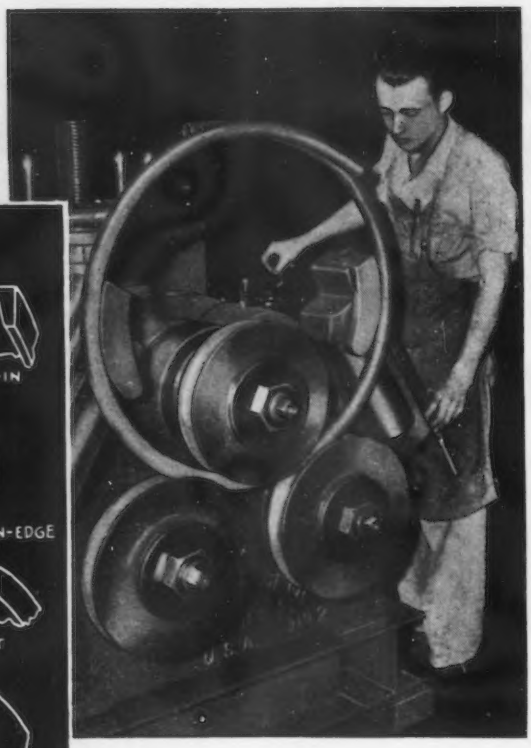

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In a fraction of the time required by ordinary methods, one man and a Buffalo Bending Roll can turn out a wide variety of accurate, uniform circular forms to meet urgent production demands. Buffalo Bending Rolls are easy to operate, even for unskilled labor—and their husky construction insures continuous, trouble-free performance . . . Minutes are precious—"Buffalo" can point the way to conserve them on bending operations. Write for Bulletin 352-A, containing full engineering data.

ARMY E NAVY

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"Buffalo" **BENDING ROLLS**

Locomotive Orders Climb; Cars Down

Washington

• • • **Class I railroads** on August 1, 1943, had 27,795 new freight cars on order according to the Association of American Railroads. On the same date last year they had 36,453 on order.

Of the total number on order on August 1, this year, there were 4,094 plain box; 2,525 automobile box; 5,754 gondolas; 14,184 hoppers; 200 stock, and 1,038 flat cars.

Railroads also had 1,014 locomotives on order on August 1, this year which included 485 steam, four electric, and 525 Diesel locomotives. On August 1, 1942, they had 881 locomotives on order which included 334 steam and 547 electric and Diesel.

Class I railroads put 12,030 new freight cars in service in the first seven months of 1943, compared with 51,606 in the same period last year. Those installed in the seven months of 1943 included 4,682 hopper, 4,905 gondola, 1,673 flat, 135 automobile box, 585 plain box, three stock, and 47 miscellaneous freight cars.

They also put 343 new locomotives in service in the first seven months this year, of which 230 were steam, 14 electric, and 99 Diesel. New locomotives installed in the same period last year totaled 432, of which 175 were steam and 257 were electric and Diesel.

The ODT also report 48 new locomotives on order on August 1 and 16 new locomotives installed in the first seven months of this year by other than Class I carriers. This brings the total of new locomotives on order on Aug. 1 to 1,062 and the number installed during the first seven months to 359.

July Railroad Freight Up

Washington

• • • **Railroads of Class I** in the United States handled about nine per cent more ton-miles of revenue freight in July, 1943, than was handled in the corresponding month of 1942, according to a preliminary estimate prepared by the Association of American Railroads.

In the first seven months of 1943, Class I railroads performed nearly 19 per cent more revenue ton-miles of service than in the same period of 1942, 62 per cent more than in the same period of 1941, and 138 per cent more than in the first seven months of 1939.

ABLE TO TAKE IT--

IN THE TOOL ROOM OR ON THE PRODUCTION LINE

Built to "dish it out" and take it, too, Uncle Sam's tanks demand tough materials and skilled design to give them stamina and striking power.

The same principles hold for milling machines —the machine tools that are mighty important in building tanks and other weapons. In tool room or on the production line, milling machines must be built to perform at a record-breaking pace and maintain close tolerance-accuracy in operation.

The center bearing on the spindle of Milwaukee Milling Machines reduces by one-half the distance between bearings—*increases rigidity eight times!*

Ask the man at the controls of a Milwaukee—he can tell you how important this center bearing is (in addition to the husky column) in providing built-in rigidity and all that it means in sustained accuracy — longer cutter life —smoother performance at all speeds and feeds.

KEARNEY & TRECKER
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Buy Victory with at least 10% in War Bonds!

Milwaukee **MACHINE TOOLS**

Briefly Told—

Postwar Survey Shows Industrial Planning; Magnesium Production Up

• One company in five plans to invade new fields after the war, according to a postwar survey by the management consulting firm of McKinsey & Co., New York. Two out of three companies plan new development in related lines. The poll covered 100 companies in 22 major industries. Six out of ten firms contacted have already begun postwar planning, with large companies showing greater interest. Indicative of postwar trends is the wartime development of plant decentralization. More than one manufacturer has found that small plants in rural areas have definite cost advantages over large factories in urban sections. Twenty per cent of the firms polled anticipate a substantial increase of employees while 45 per cent look for sharp reductions.

•

• Production of magnesium castings has reached a rate three times as great as at the time of the Pearl Harbor attack, the WPB revealed recently. Incendiary bomb magnesium castings are not included in the totals, but WPB indicated that these castings have shown large production increases.

•

• *Describing the significant part that selection and adjustment of equipment and proper surface preparation play in spot and roll welding of aluminum aircraft parts, a 4-page, illustrated, feature article, "Spot Welding for Victory," by Don Holden, foreman of spot welding, Vega Aircraft Corp., Burbank, Cal., appears in the July-August issue of* Oakite News Service, *house magazine of Oakite Products, Inc., 304 Thames Street, New York.*

•

• To recompense employees who have aided in the development of its products by developing patentable ideas, the Glenn L. Martin Co., Baltimore, has set up an Employees' Patent Remuneration Plan, under which such employees are given an equitable share in any income derived from their inventions through the licensing of outside manufacturing rights. The employee-inventor will receive a share of the proceeds from such licensing starting at 10 per cent until the inventor has received $5,000, and according to a sliding scale thereafter.

•

• W. W. Rose, executive vice-president of the Gray Iron Founders' Society, Cleveland, is to speak on wartime conditions in the cast iron industry before the Washington Gray Iron Founders' Association, meeting Tuesday, Aug. 31, at the Washington Athletic Club, Seattle.

•

• Inland Steel Co., Chicago, has reported that five blast furnaces at Indiana Harbor have maintained uninterrupted production for more than three years in what is believed to be a group continuous operational record. The five furnaces have been operating at maximum capacity since Aug. 6, 1940, each producing about 1000 tons of iron daily.

•

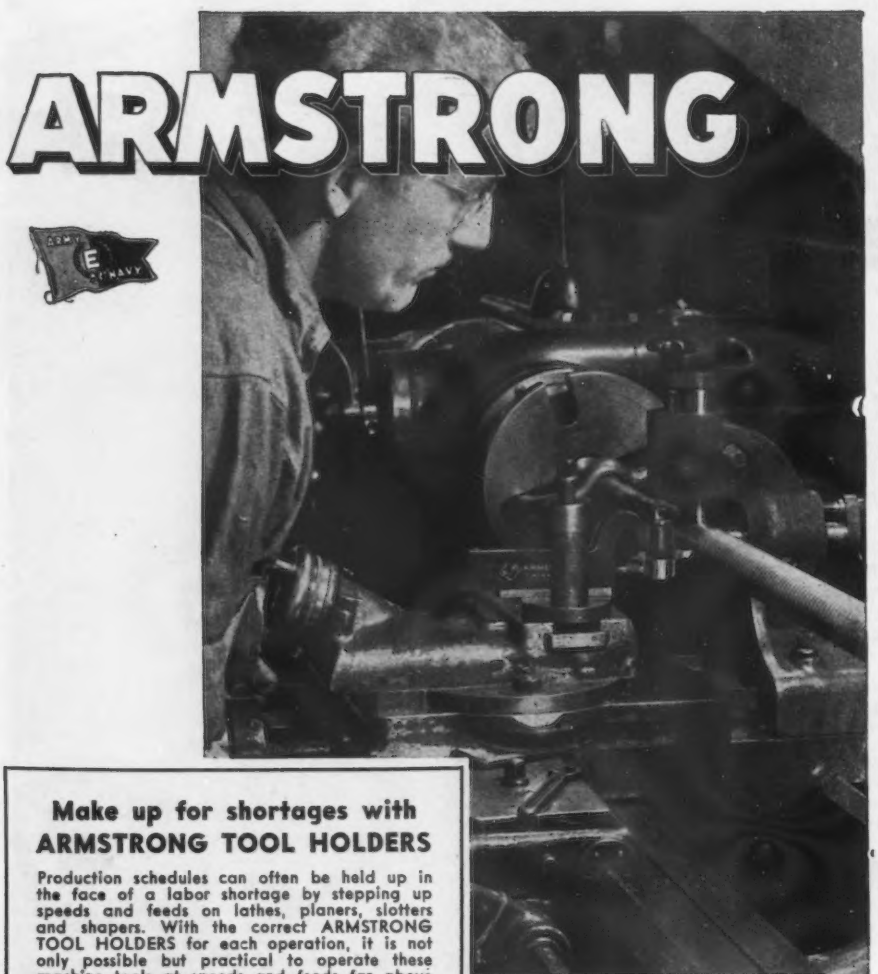
• Earnings, man hours and payrolls rose to new peaks in June, according to the regular monthly survey of twenty-five manufacturing industries by The National Industrial Conference Board. Employment in these industries in that month was higher than in any previous month except March, 1943. Hourly earnings in June averaged $1.016 at which figure they were 0.7 per cent higher than in May, 10.8 per cent higher than in June, 1942. Weekly earnings in June averaged $46.12, or 0.4 per cent higher than in May, 16.7 per cent higher than in June, 1942.

•

• A huge gang riveter is saving 72 per cent in time and labor in the production of wing spars for the C-46 Commando, two-motored air transport, according to Curtiss-Wright Corp. officials. The big spars are fed into the riveter by a reversing type motor acting on a carrying frame. Bucking and riveting rams are controlled hydraulically and equipped with a control correcting any variation in stock thickness at rivet level. It is operated by one man.

•

• Twenty-three locomotives are being manufactured by H. K. Porter Co., Inc., for the Carnegie-Illinois Steel Corp. The group includes six diesel electrics and six steam locomotives in the 60 and 35-ton classes which will be used at the Homestead, Pa., Works of the Carnegie company. The diesels will be



Make up for shortages with ARMSTRONG TOOL HOLDERS

Production schedules can often be held up in the face of a labor shortage by stepping up speeds and feeds on lathes, planers, slotters and shapers. With the correct ARMSTRONG TOOL HOLDERS for each operation, it is not only possible but practical to operate these machine tools at speeds and feeds far above those accepted as "standard." ARMSTRONG TOOL HOLDERS will not only stand up to but will cut efficiently and safely at speeds ordinarily attained only on automatic production tools. If hampered by a shortage of labor or machine tools, your first logical move is to step-up all operations employing ARMSTRONG TOOL HOLDERS.

Equal to the shortage of men and machine tools is the shortage of high-speed-steel. Here again the use of more ARMSTRONG TOOL HOLDERS is logical because ARMSTRONG TOOL HOLDERS save: 90% high speed steel—make each ounce of high speed steel do the work of 10 ounces in forged tools.

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No Production Machine can "Dictate" Too Fast for this

"STENOGRAPHER"

High-speed coil winders and fast automatics can't run too fast for this Veeder-Root High Speed Reset Counter to keep an accurate, up-to-the-minute record of operation. Specially constructed for high-speed service, this device may be furnished either as a Direct Drive Counter, registering 10 units for each revolution of the shaft . . . or as a Revolution Counter, registering one unit for each revolution.

It's a quick and easy matter to equip high-speed war production machines with this compact, long-lived counter. And then each machine so equipped will be able to tell you, at a glance . . . in plain black-and-white figures . . . exactly how production stands *right now*. So lagging machines can be brought into line, mechanical troubles spotted and corrected before damage is done, and maintenance anticipated safely in advance of actual need. This High-Speed Reset Counter is one of scores of types of Veeder-Root Counting and Computing Devices, electrically and mechanically operated . . . designed to count in any units, on any type of machine. And *you* can count on Veeder-Root to help make your war work count to the utmost.

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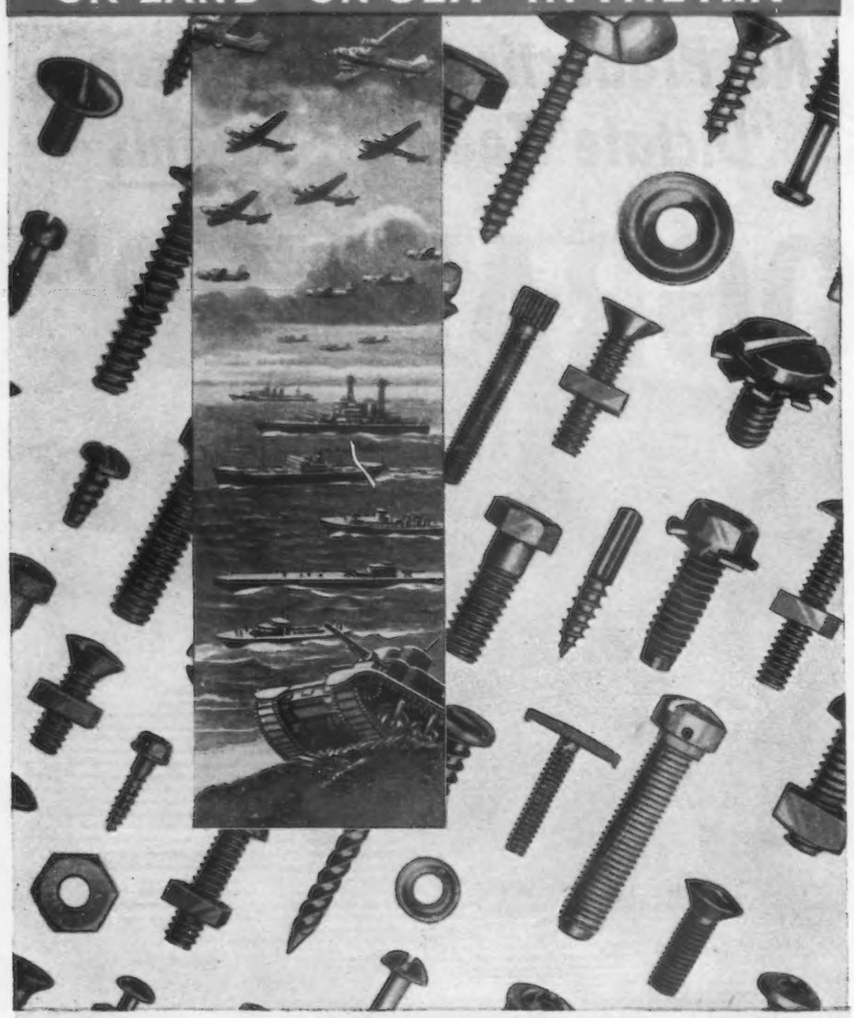
Scientific Sentinels of Safety

ON LAND · ON SEA · IN THE AIR



Deep within the vital parts of practically every modern weapon of war on land, on sea and in the air, HOLTITE Screws, Bolts, Nuts and allied fastenings perform tasks far beyond ordinary demands. Their uniform precision and rugged construction provide the time-saving application and faultless performance so essential in the war production program. From metallurgical control of selected raw materials to final rigid inspection, every scientific device and human skill is employed to make HOLTITE fastenings the most trustworthy Sentinels of Safety. Specify them on your next order.

HOLTITE
–Phillips–
Screws & Bolts
cut fastening
time in half.

CONTINENTAL SCREW CO. New Bedford, Mass., U.S.A.

BUY MORE WAR BONDS

the first of that type used at Homestead in an attempt to eliminate smoke and steam inside buildings.

●

● Belle City Malleable Iron Co., Racine, Wis., distributed $35,000 in bonuses to more than 1000 employees recently. Awards ranged from $5 in war stamps to those employed less than a year to $100 for those working 30 years or more.

●

● The cost of living for wage earners and lower-salaried clerical workers in July declined in 58 of 65 industrial cities surveyed by the National Industrial Conference Board. Living costs were higher in 6 of the cities, and remained unchanged in 1 of them. The largest decline, 2.3 per cent, occurred in Manchester, N. H., but there was a decline of 1.8 per cent or more in 32 other cities. The largest increase, 0.8 per cent, occurred in New Orleans. For the United States, as a whole, the cost of living declined 1.2 per cent.

●

● With two women employees receiving highest individual honors, General Electric workers during the first six months of 1943 turned in worthwhile production suggestions at a rate 41 per cent above last year's record-breaking totals.

●

● Mrs. Edith Hogan of the West Lynn, Mass., plant received $1,250 for a plan which saves 400 man hours a week, and Mrs. Anna Turnbull of the Bridgeport, Conn., plant received $900, the second largest award. During the six-month period 11,395 production suggestions were accepted.

●

● The pipe mill of the Reading Iron Co., one of the largest industrial buildings in Reading, Pa., will undergo a $400,000 renovation program and within three months will house approximately 500 workers, the Pennsylvania State Dept. announced recently. The Container Corp., Van Wert, Ohio, has purchased the pipe mill for the production of fiber drums and barrels.

●

● Every manufacturer and every industry in the country is going to do everything possible to get into civilian production after the close of the war and thereby provide employment, Charles F. Kettering, vice-president, in charge of research, General Motors Corp., said early this week in a radio address presented by the World Wide Broadcasting Foundation of Boston, in collaboration with the Carnegie Endowment for International Peace.

●

● Milwaukee area industrial plants contributed about 45,000 tons of steel in WPB "Share the Steel" campaign to date.

●

● The war will be won "in less than a year" in the opinion of President James H. Rand, Jr., president of Remington Rand, Inc. The prediction was conveyed to stockholders at the first annual meeting to be held in Buffalo by Executive Vice-President Stanley M. Knapp. Rand was unable to attend because of the pressure of war business.

●

● Because it is remote from centers of labor supply the huge Carrollville plant of the du Pont interests located on a 65-acre site adjoining Lake Michigan south of Milwaukee and comprising some 15 buildings, has been turned over to wreckers to satisfy the demand for critical steel buildings suitable for re-erection at other points.

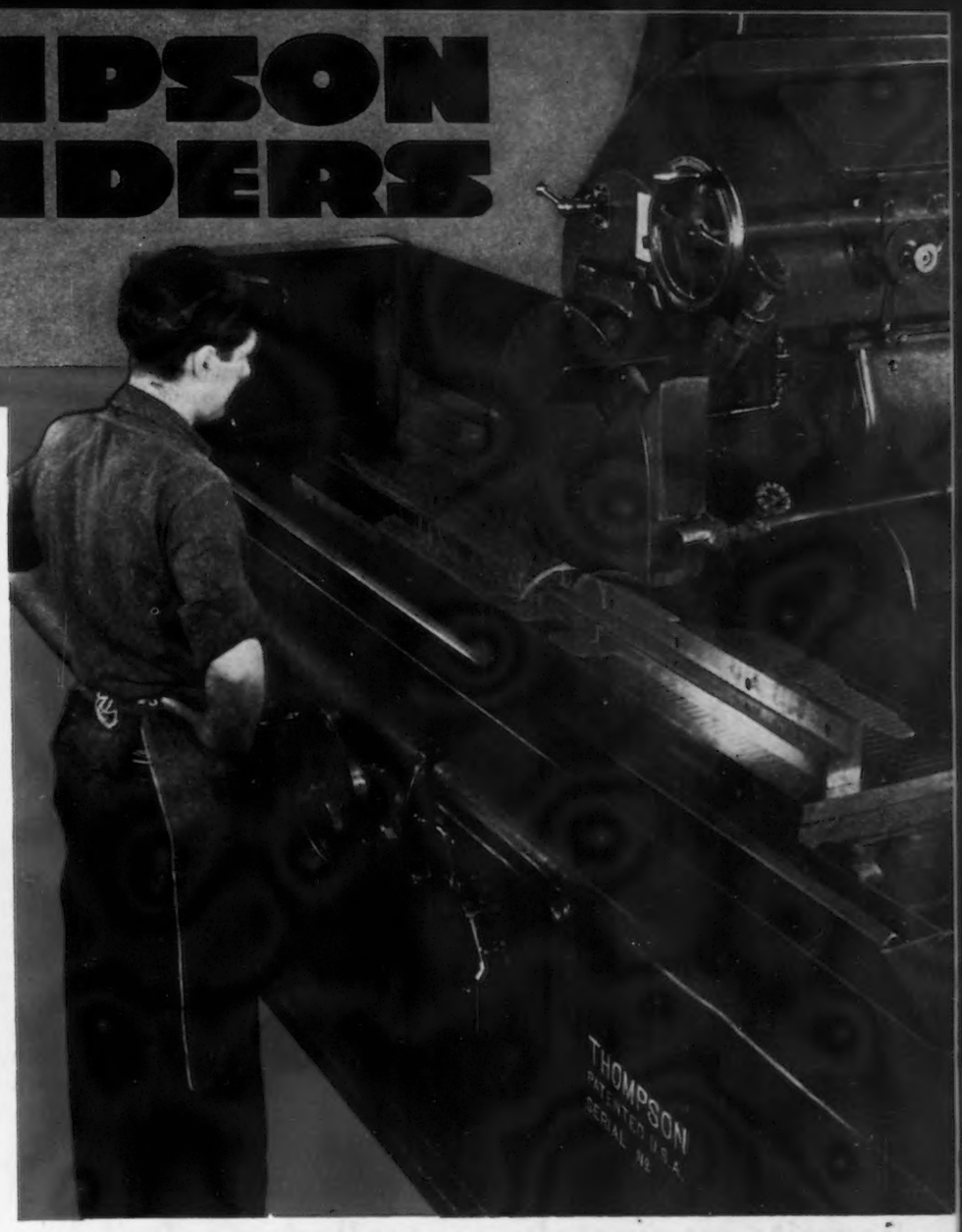
●

● Both the Bucyrus-Erie Co. and the Harnischfeger Corp., Milwaukee, showed increases in net earnings for the first six months of 1943, Bucyrus having $864,888 against $531,083 in 1942, and Harnischfeger having $665,757 against $576,797 for the year before.

●

● Production was resumed Aug. 19 at the large Praco coal mine of the Alabama By-Products Corp. near Birmingham after a fire three weeks before had destroyed the mine's tipple and washery. Coke oven production of the corporation, which operates five other coal mines, was not impaired.

THOMPSON GRINDERS



Precision ground parts for precision built lathes

● This type C Thompson Grinder installed in the plant of one of the pioneer manufacturers of Turret Lathes is maintaining particularly close tolerances on a wide range of work.

The motor mounted directly on the grinding spindle not only eliminates excessive maintenance but provides greater power and a drive that is permanently trouble free and vibrationless.

The hydraulic drive to table permits higher feeds and speeds—smooth vibrationless operation—and the use of new type free cutting grinding wheels resulting in a fast, cool cutting operation and less distortion in the work.

For dependable accuracy over long periods make your next grinder a Thompson.

Thompson Grinders are built in a wide range of types and sizes. Largest Type C—36"x36"x240".

THE Thompson GRINDER CO.

SPRINGFIELD, OHIO

Dayton Initiates Model Manpower Plan; Wins Renewed War Contracts

Dayton, Ohio

• • • **The campaign** by which the Ohio neighbor cities of Dayton and Springfield halted in-migration and balanced their manpower needs with their supply of labor is perhaps the nation's outstanding example of effective community action on wartime manpower problems, the Office of War Information reports.

The community campaign relieved much of the stress on community services and wartime living conditions in the area. It has stopped most of the flow of outsiders into the community where no housing was available to them and made it possible to carry on war production with the persons already established in Dayton and Springfield.

The Steps Taken

Dayton relieved its situation through the following steps:

(1) The WMC area labor-management committee stopped in-migration. All manufacturers and retailers in the area agreed not to hire any persons who had been in the community less than 30 days, except with the approval of the United States Employment Service. Approval is granted only in cases of key workers or construction laborers, there being a local shortage of the latter. As a result, hiring of outsiders has fallen from 500 a week to about 125.

(2) Dayton and Springfield manufacturers voluntarily agreed not to seek any contracts that would require them to hire more workers than they had estimated they would need in their OES 270 (manpower inventory) reports of May 1, except with WMC approval.

(3) Retailers, including the large department stores, agreed to reduce full-time employment to 1940 levels.

(4) The Wright and Patterson air fields, for purposes of operating efficiency, adopted a policy of decentralizing wherever possible and took definite action toward fuller and better utilization of manpower at the fields.

Permits accurately controlled air-fuel ratios in open hearth and other furnaces

Other forms of THERM-O-FLAKE INSULATION

Brick—Unusual stability for high temperatures, especially suited for back up insulation.

Blocks—Highly efficient insulation, where larger size units may be required.

Concrete—Monolithic insulation with high structural value for a variety of uses.

Granules—Loose-fill, efficient insulation weighing about six pounds per cubic foot.

High fusion, light weight THERM-O-FLAKE Coating insulates to minimize heat losses . . . AND reduce cold air infiltration. As a result, accurate air-fuel ratios and highly efficient combustion are obtained.

THERM-O-FLAKE Coating works with surprising ease. Trowelled or gunned—it spreads unusually fast and is economical because of its greater coverage.

Find out how THERM-O-FLAKE Coating does this Double Duty as a part of regular furnace maintenance. For complete information write: The Illinois Clay Products Company, Joliet, Illinois.

Illinois Clay Products Company
JOLIET, ILL.

Therm-O-flake
HIGH TEMPERATURE INSULATION
COATING

WAR PLANT TOUR: On a tour of Detroit war plants, Gerard Swope (right), president of General Electric Co., is shown by W. G. Robbins (left), president, Carboloy Co., Inc., subsidiary of GE, the fifty thousandth cartridge case die produced since Pearl Harbor by Carboloy.

PRODUCT IMPROVEMENT IS IN THE AIR

TODAY our strategically-located factories are 100% on war work.

But even as we fight, Houdaille* management and engineers are anticipating the demands of the post-war world.

Out of this high-pressure war experience we are evolving new engineering and metallurgical concepts and improved production techniques which, in days to come, are bound favorably to affect the things you buy and use.

We will continue increasingly to provide vital, precision parts to the automotive, aircraft, electrical refrigeration, radio, marine, railway equipment, and other important industries—but we will also make substantial contributions to industries yet unborn.

In every Houdaille division, product improvement is in the air—we are doing our share of *forward thinking.*

In your home, on land, sea or in the air—after this war is over—you will enjoy, more and more, the benefits of Houdaille's highly-specialized skills.

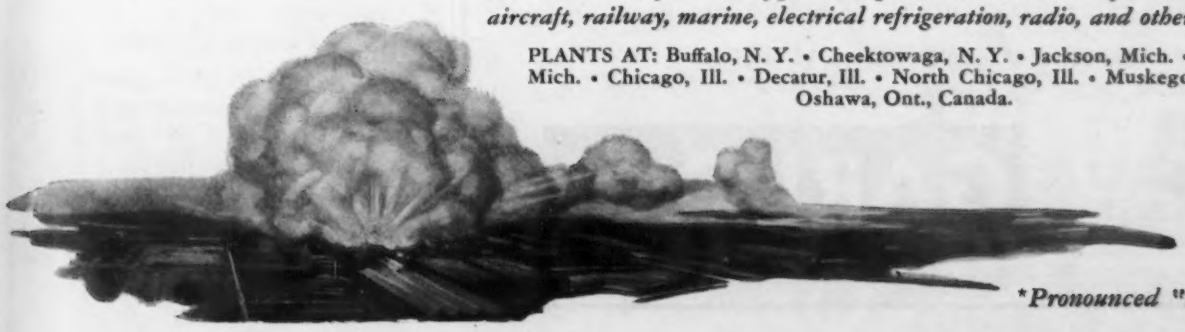
HOUDAILLE-HERSHEY CORPORATION

General Executive Offices—Detroit

•

Peacetime manufacturers of precision parts and mechanisms for the automotive, aircraft, railway, marine, electrical refrigeration, radio, and other industries.

PLANTS AT: Buffalo, N. Y. • Cheektowaga, N. Y. • Jackson, Mich. • Detroit, Mich. • Chicago, Ill. • Decatur, Ill. • North Chicago, Ill. • Muskegon, Mich. Oshawa, Ont., Canada.



**Pronounced "HOO-DYE"*

(5) The larger war plants declared a 90-day moratorium on hiring while determining the true manpower situation in the community.

(6) Radio stations, posters, and newspapers warned outsiders to stay away from Dayton unless they possessed special skills not available in the community.

(7) Manufacturers and the air fields were polled to secure revised and realistic estimates of future labor needs. It was determined that manpower estimates for the year ending May 1, 1943, were 11,085 more than actual hirings. The poll resulted in decreasing manpower estimates for the next three months by 9,622 and for the next year by 18,394.

(8) Since women were the area's biggest source of potential manpower, manufacturers were asked to "reserve" certain occupations exclusively for women. It was found that women could do 6,000 jobs now being filled by men.

(9) Volunteers conducted a Gallup-type poll of the women in the area and found there were more available for wartime jobs than had been estimated previously. WMC had credited Dayton-Springfield with 9,000 potential women workers not already employed. The new poll showed 10,137 women available full time, 7,508 part time, and 9,272 "available maybe."

(10) An information campaign is now being conducted through newspapers, press, billboards, radio, motion pictures and special pamphlets to get women to take wartime jobs.

(11) Stores, banks, ration boards, barber shops, beauty parlors and other community services were persuaded to remain open two nights a week for the benefit of war workers, the first war center in the nation to take this important step. After several weeks, the banks reported that transactions on one night are heavy; on the other nights light. Department stores reported their sales have increased although operating expenses remain the same.

(12) Many Dayton families have responded to a patriotic appeal and have "opened their homes" to war workers. A house-to-house canvass made in connection with the appeal, located enough vacant rooms to house room-seekers in the area and leave a surplus of 850 rooms. Many famillies for the first time rented one, and sometimes two rooms.

(13) 500 private homes were converted into apartments, several dormitories were erected and housing projects speeded to fill the acute need for family-type housing in the area.

(14) Nine buses were added to the line providing service to the air fields, located in isolated sections between Dayton and Sprinfield. Expansion of the fields created the greatest demand for manpower in the area. However, Dayton, which supplied 90 per cent of the workers to the fields, found that the bus lines between the city and the fields were so overtaxed that workers often had to wait as long as an hour and a half for room on a bus spent that time in line at unsheltered loading stations. Sheltered platforms were built and nine large buses added to the line, cutting the waiting time to 15 minutes or less, as a result of Emergency Committee action.

(15) A special survey was made preparatory to organizing a community-wide recreational program in both Dayton and Springfield.

(16) Frills were eliminated from laundry and restaurant services so that more people could be served and waiting time decreased.

They'll let 'em have it!

Our Navy will give 'em the works, if we'll give 'em all we've got back here in America. That means working a *full* week *every* week . . . it means no unnecessary driving . . . it means conserving materials . . . and it means that we must all buy War Bonds regularly. Let's all do our part today and every day until the war is won!

THE GARLOCK PACKING CO., PALMYRA, NEW YORK
In Canada: The Garlock Packing Co. of Canada, Ltd., Montreal, Que.

GARLOCK

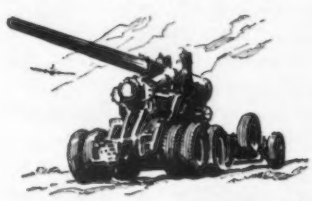
Parts for industry

UPSET FORGINGS • DROP FORGINGS • MEEHANITE CASTINGS • NON-FERROUS CASTINGS • STEEL ALLOY CASTINGS • CENTRIFUGAL CASTINGS • IRON CASTINGS • BEARINGS • MOLDED PLASTIC PARTS • AIR COMPRESSORS

for Excavating

Placer dredge buckets. Power shovel dippers. Dredge pumps. Non-ferrous bearings and castings.

for Guns

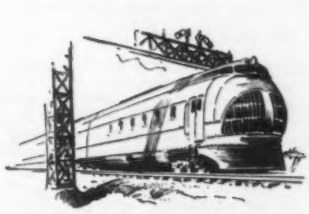


Upset forgings, non-ferrous castings for naval and field guns. Liners. gear blanks, parts for gun assemblies.

for Planes

Tail wheel assemblies and retractable landing gears. Actuating cylinders. Brake lining. Non-ferrous castings. Forgings.

for Trains

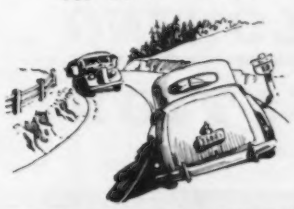


Brake shoes. Journal bearings. Meehanite castings. Freight car wheels. Manganese steel center and wear plates.

for Ships

Strut and stern tube bearings. A-B-K deck plates and safety treads. Air compressors. Non-ferrous castings and bearings.

for Cars — Trucks



Brake lining, clutch facings, fan belts, radiator hose. Axles, shafts, gear blanks and engine forgings. Service equipment.

for Battle

Steel armor plate. Bomb part castings. Shell and shot forgings. Torpedo parts. Parts for guns.

58 PLANTS SERVING INDUSTRY AND TRANSPORTATION

American Brakeblok Division
Detroit, Mich.

Ramapo Ajax Division
New York City

American Manganese Steel Division
Chicago Heights, Ill.

Brake Shoe & Castings Division
New York City

Kellogg Division
Rochester, N. Y.

American Forge Division
Chicago, Ill.

Southern Wheel Division
New York City

National Bearing Metals Corp.
St. Louis, Mo.

To us each part is as important as the whole

AMERICAN Brake Shoe COMPANY

AMERICAN BRAKE SHOE COMPANY
230 PARK AVENUE, NEW YORK 17, N.Y.

How would YOU advertise a business making only parts?

We'd like your help. Suppose your company were made up of eight Divisions, with 58 plants making hundreds of kinds of parts for industry and transportation. And suppose you had growing pains, and decided to advertise for new customers. How would you tell your story?

The wide range of parts we make —or could make—is what complicates the problem.

For instance, one of our Divisions makes all kinds of iron castings—white iron, grey iron, Meehanite, and NiHard. It is the country's largest maker of brake shoes for railroads.

Another Division makes just about every type of upset and drop forging. Its plants have tremendous capacity, and its organization has, we believe, the broadest forging experience in the industry.

A third Division makes brake linings for automobiles, trucks, buses, airplanes and industrial equipment. Its "American Brakeblok" brand is a leader in this field. This Division also makes molded plastic bearings and industrial shapes.

Still another Division is a leader in the field of railroad track fixtures, and could make more products in manganese and other tough steels.

A fifth Division makes air compressors, paint spray guns, and equipment for motor service stations, and is producing machined parts for aircraft and airplane engines.

Another Division produces a wide variety of parts for heavy-duty industrial equipment, such as power shovel dippers, dredge pumps, placer dredge buckets, material handling pumps. Also logging, pulp mill and mining equipment parts. This same division manufactures special welding rod for hard surfacing and has a department devoted to heat and corrosion resistant alloys.

A seventh Division manufactures freight car wheels for railroads.

Non-ferrous bearings and industrial castings, babbitt metals and non-ferrous welding rod, are produced by still another Division.

These eight Divisions, forming American Brake Shoe Company, are capable of supplying parts and product-parts of highest quality, and in practically unlimited volume, to industry and transportation. They are served by outstanding research and engineering laboratories.

Just now we are devoting our energies wholeheartedly to producing parts and assemblies for war. We are open to additional contracts for some types of parts. When the war ends, our eight Divisions will offer a production capacity, and a know-how, that will give Brake Shoe a decided edge as a source for parts.

The problem of telling this story, understandably and with proper modesty, is a tough one. We've tried to picture it in the adjoining advertisement. But have we succeeded? If you, as a director of purchases, or a technical man, can give us any helpful suggestions, we'll tremendously appreciate hearing from you.

WLB Revises Wage Increase Regulation

Washington

• • • **In addition** to making the special exemption for small companies, the WLB has greatly simplified its entire set of regulations in General Order No. 31. This order sets forth requirements which must be met in order to make individual wage or salary adjustments for merit increases, promotions or reclassifications and in connection with apprentice or trainee programs, without applying to the WLB for approval in each case.

The formula for firms with 30 or fewer employees permits them to make merit increases without WLB approval, provided that the total of increases to any individual does not exceed 10 cents per straight-time hour during any year, starting with last July 1, and that the total amount expended on such increases during any such year does not exceed an average of five cents per straight-time hour for all the employees in the establishment whose wages or salaries are subject to the WLB jurisdiction.

Such increases must not result in rates exceeding the highest rate paid by the employer between July 1, 1942, and June 30, 1943, for jobs of similar skill, duties and responsibilities.

As in the case of the larger companies, such increases are not to result in any appreciable rise in production costs, furnish a basis for a price increase nor be used as a basis for asking the WLB for approval of increases in other rates to eliminate intra-establishment inequities.

The increases cannot be made if they are contrary to the terms of any collective bargaining contract covering any or all of the employees of the company involved.

If the small company wishes, it may apply to the WLB for approval of a schedule for making individual pay increases in the same manner as provided in other sections of General Order 31 for companies with more than 30 employees.

The original General Order 31 was issued June 1, 1943. As amended it contains a new and simplified plan for individual increases which companies may use if they do not have a schedule which meets Board requirements. Companies also may apply to the Regional War Labor Board for approval of their own proposed new schedules.

Unless they operate under schedules meeting WLB specifications as outlined in General Order 31, companies with more than 30 employees must obtain Board approval of individual wage increases, even if they are of the so-called "merit increase" type.

Schedules, to meet WLB specifications, must contain the following, the Order explains: (1) job classification rates or rate ranges, and (2) a *plan* for making individual adjustments within and between such rates or rate ranges.

Existing schedules do not require Board approval if they fulfill the specifications in the Order for job descriptions and for a plan of procedure for making adjustments, and if the plan was properly in existence because it either:

1. Was contained in a collective bargaining contract or other bona fide, established agreement which was in effect on June 30, 1943; or
2. Conformed to written statements, minutes or memoranda of the employer which were in existence and effect on or before June 30, 1943; or
3. Was a plan approved by the WLB or any of its authorized agents.

Employers who cannot meet those specifications with their established schedule may apply for Board approval of a schedule or they may adopt a plan outlined in the General Order without seeking WLB approval.

This plan permits increases as follows:

1. Merit increases or automatic length-of-service increases: These must be made only within job classification rate ranges. The total to any individual employee shall not exceed,

THE KEY TO *FLOWING* MILL PRODUCTION

Steel coils on Logan Heavy-Duty Apron Conveyor move toward uncoiler from processing operations. *INSET*- Logan Heavy-Duty Rolls handling coils in leading steel mills.

HEAVY-DUTY Logan Conveyors are essential units in the mass production process in many leading steel mills. Engineered by men who know steel mill requirements, Logan Conveyors keep strip, sheets and coils *flowing* through mill processing operations at wartime tempo. Why not investigate the possibilities of streamlining your mill handling operations with conveyors? Call in your nearest Logan engineer, or write for your copy of the informative book, *Conveyors for the Steel Mill*, Logan Co., Inc., 545 Cabel, Louisville, Ky.

Logan Conveyors

PUT *FLOW* INTO PRODUCTION

Maps in minutes...by *Multilith*

YOU can't expect even the Marines to know where every enemy gun, pillbox and tank trap is when they first land on a hostile shore. So they take a Multilith* machine with them.

Right on the beach—as moment-by-moment reports come from scouts—enemy positions are instantly drawn on a paperlike Multilith master, slipped onto the machine, and correct maps run off for quick distribution, to save lives of fighting men.

This is the same machine and the same paperlike master (called Duplimat*) that thousands of businesses are using to speed production schedules, save vital man hours and assure accuracy.

You probably have in your office and factory a Multilith (or Multigraph* or Addressograph* which save in other equally important ways). Let us help you make sure you are getting all the uses and values these modern machines have for you. There is no obligation except the obligation we all have to produce everything we can as fast as we can for victory. Write Addressograph-Multigraph Corporation—Cleveland and all principal cities of the world.

*T. M. Reg. U. S. Pat. Off.

Multigraph

TRADE-MARK REG U.S. PAT OFF

SIMPLIFIED BUSINESS METHODS

during any year (beginning July 1, 1943), 10 cents per straight-time hour or more than two-thirds of the difference between the appropriate minimum and maximum rates, whichever increase is greater. The total amount expended on such increases during any such year shall not exceed an average of 5 cents per straight-time hour for all the employees in the establishment who are covered by the plan and whose wage or salary rates are subject to WLB jurisdiction.

2. Promotions or reclassifications: When promoted or reclassified into a higher-rated job classification, an employee may receive a rate not in excess of 15 per cent above his rate on his former job or the minimum rate for the new job, whichever is higher. Where an employee has special ability and experience, he may be paid a rate within the appropriate range corresponding to such ability and experience.

3. Apprentice or trainee programs: These involved individual rate adjustments, resulting from improvement, over specified periods of time, in the productive abilities of apprentices or trainees who are employed under a bona fide apprentice or trainee program (as defined in the Order). The increases in rates must conform to standards set forth in a collective bargaining agreement or in the applicable regulations of federal or state agencies.

"Merit increases" are defined as "individual wage or salary adjustments made as a reward for improved quantity and/or quality of work or service."

"Automatic length-of-service increases" are defined as "individual adjustments usually made automatically at the end of specified periods of satisfactory service."

WMC Warns Large Scale Transfer to War Work Needed

Washington

• • • **Allied victories** and advances, requiring increased military personnel and stepped-up production, will call for large-scale transfers from non-essential to war-essential activities, according to Paul V. McNutt, WMC chairman.

"While we can be optimistic about the course of the war," said Mr. McNutt, "there can be no complacency over our manpower situation. Between now and July, 1944, a rock-bottom minimum of 2,600,000 persons must transfer from less essential jobs to munitions production or to jobs in the great number of community services that are essential to the health, transportation and other vital accessories of civilian life."

According to the latest reports of WMC, there are 55 areas of acute labor shortage and 111 areas of insufficient labor supply or in which a labor shortage may be expected within six months. These two groups include more than 20 of the nation's largest cities.

In addition to the areas where a labor shortage is immediate, there are 81 areas in which a general labor shortage may be anticipated after six months. By next July it is expected that 45 out of 50 of the nation's largest population centers, in addition to great numbers of medium and small centers, will be included within labor shortage areas.

STEEL MEN TOUR ABERDEEN: Major Levin H. Campbell, Chief of Army Ordnance, points out the nomenclature of a rifle at Aberdeen Proving Ground, Md., to B. F. Fairless, president of United States Steel Corp., Eugene G. Grace, president of Bethlehem Steel Co., and W. F. Detwiler, chairman, Allegheny-Ludlum Steel Corp., during a recent inspection tour by the WPB Steel Industry Advisory Committee.

Start with the BEARINGS

• Practically every day we read that a new record of performance has been established. One day it's a plane . . . setting a new mark for speed . . . or altitude . . . or distance. The next day it's a machine tool . . . providing longer hours of operation . . . with greater loads and speeds. These records are possible only when the motive unit operates with the highest degree of efficiency.

SLEEVE TYPE BEARINGS
Any Size
Any Type
Any Quantity

Before any motive unit can operate efficiently it must be equipped with the *correct* type of bearing for each application. That's where we come in. For more than thirty-five years we have helped manufacturers of all types of equipment select the bearing that will deliver the greatest performance.

At the present, all of our manufacturing facilities are engaged in the production of sleeve bearings for armament. But our advice and counsel is available. Simply write us and a Johnson sales engineer will call on you . . . at your convenience.

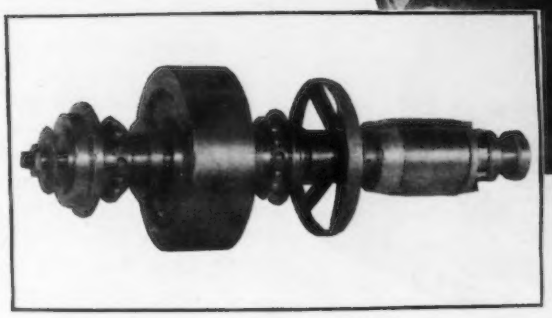
JOHNSON BRONZE
SLEEVE BEARING HEADQUARTERS
The MOST COMPLETE SLEEVE BEARING SERVICE in the WORLD
505 S. MILL STREET NEW CASTLE, PA.

THE MILWAUKEE FACE MILL GRINDER GIVES YOU ALL THREE!

1 UNUSUAL RIGIDITY

2 REDUCED SHARPENING TIME

3 ACCURACY TO WITHIN .0002 PER INCH



The three-bearing spindle rotates at 3,400 R.P.M. and carries a heavy flywheel, the inertia of which when in motion successfully keeps the abrasive wheel up to grinding speed. Sharpening time has been considerably reduced as a result.

THE basic design of the Milwaukee Face Mill Grinder embodies strength, precision, and capacity. It is capable of sharpening Tungsten Carbide Cutters ranging from 3″ to 16″ in diameter — grinds the blades to within .0002 per inch.

Set-ups are quickly made with graduated dials, facilitating adjustments. Other controls are handily located for simplified operation.

OTHER IMPORTANT FEATURES:

1. Jeweled bearing dial indicator for accurate checking.
2. Finger tip control.
3. Fine thread precision saddle screw.
4. Hand screw permits angular setting of 15° on either side.
5. No adapters necessary.
6. Spindle has No. 50 National Standard Taper.
7. Blower system at slight extra cost.

Reject the Source of the Error . . . not the Finished Product . . . USE CENTER SCOPE!

The Center Scope is an optical locating machine shop tool, constructed for use on any machine from jig borers to bench drills. No technical knowledge or training is needed to use it. It is a necessary production tool — necessary today because you are interested in saving time — tomorrow, because you will be interested in saving cost.

Built in various models; variable and rotating Center Scope priced at $97.00, with taper shank, $125.00; Special Center Scope, $125.00 — Edge Block, $23.00 additional.

Write Department CS, for complete information.

KEARNEY & TRECKER PRODUCTS CORPORATION • *Milwaukee, Wisconsin*

Rotary Head Milling Machine
•
Autometric Jig Borers
•
Center Scope

Kearney & Trecker Products
CORPORATION
Milwaukee, Wisconsin
Subsidiary of Kearney & Trecker Corporation

Milwaukee Face Mill Grinder
•
Milwaukee Midgetmill
•
Milwaukee Speedmill

Warehouses Expect to Defer Most Fathers in Skilled and Unskilled Classes

Cleveland

• • • **"You may be able** to keep every father you employ," members of the Steel Products Warehouse Association, here were told reccently in their official organ. This statement was qualified by the restriction that the employer be located in a labor shortage area. Draft boards have been authorized to take pre-Pearl Harbor fathers beginning Oct. 1, but not many men engaged in essential work are likely to be called.

Here is the situation in a nutshell: except in hardship cases 3-A (dependency) deferments won't mean much in the future. Men in that group can be reclassified at any time. However, it will become easier to obtain occupational deferments. Formerly only essential workers in essential industries were eligible for such deferments. Now even unskilled workers are eligible if local conditions make them impossible to replace.

Based on information obtained from the United States Employment Service, local boards are told to determine for each registrant (a) The shortage of workers possessing the registrant's skill. (b) The shortage of workers to replace the man even though he is an unskilled worker. (c) A possible local shortage in the place of employment even when no national shortage exists.

Skilled workers have been eligible for deferment since early June. The new rules—which permit even unskilled workers in essential industries to be deferred under certain conditions—obviously reinforces the protection already given to skilled workers. Moreover, WMC now has placed on top of the list of essential occupations a new list of 149 critical occupations. Men in these jobs should be as draft-proof as it is possible to be. Foremen probably will qualify under this heading—so w i l l y o u r millwrights, blacksmiths or accountants.

At the other end of the line, WMC also has expanded the list of non-deferable occupations.

Warehouses now are in good shape as far as the draft is concerned. If local boards follow instructions, they will defer all skilled warehouse workers plus a large portion of unskilled warehouse workers (not on the non-deferrable list) employed in shortage areas. Local boards won't grant deferments automatically or indiscriminately.

You'll have to file your deferment applications as in the past and get the evidence from USES which will justify deferment of your workers, particularly unskilled men. If you do act promptly and carefully, you'll probably be able to keep the fathers you now employ. Keep in mind that if you can get one six-month deferment for a father, he'll probably never be called, the organ stated.

The young man above is removing enamel dust with a Spencer Vacuum System.

Tank and plane manufacturers remove bolts, nuts, etc., after assembly and to clean before painting.

In watch factories gold dust is trapped in the room where it accumulates. Reclamation paid for the equipment in a few weeks.

A painting contractor removes sand by the ton from the holds of ships and rabbit fur is collected, segregated and reclaimed in a New York fur plant.

Solder is gathered around auto assembly lines and tons of babbitt picked out of engine heads as they pass by on the production line.

The same equipment will clean floors, walls, and machinery in less time. Get the facts from our Bulletins.

243 C

SPENCER HARTFORD VACUUM CLEANING

THE SPENCER TURBINE COMPANY, HARTFORD, CONN.

Witherow Named Chairman

Pittsburgh

• • • **The Blaw-Knox Co.,** at a recent meeting of the board of directors, elected William P. Witherow chairman of the board. Mr. Witherow will continue to serve as president of the company.

MOORE RAPID

Lectromelt

FURNACES

SIZES UP TO 100 TONS

ARMY E NAVY

The ruggedness of Lectromelt top charge furnaces assures larger tonnages of high alloy steels. Their simplicity affords longer, more efficient service with minimum maintenance. Their quick charging features enable them to produce steel faster.

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH, PENNSYLVANIA

Coordinated Price Control Seen

Washington

• • • **Closer inter-American** cooperation in price control is evolving from the hemisphere's battle against rising living costs. This is the report brought back to Washington by Seymour E. Harris, director of export and import price control, U. S. Office of Price Administration, after a trip to South America.

Mr. Harris reported growing interest in South America in price control measures and a readiness in the countries he visited to join hands in a cooperative effort to protect consumers against excessive price raises.

To make this price control more effective on a hemispheric basis, Mr. Harris made a number of recommendations to price control authorities in the countries he visited. His major recommendations included:

1. Elimination of new and additional middlemen who have entered the distribution of imported goods, apparently to take advantage of opportunities for profiting by wartime scarcities.
2. Control of profit margins charged by importers and distributors of imported goods.
3. Control of the movement of goods from customs warehouses to prevent goods from getting into the hands of speculators.

"In some of the other American republics, living costs have been advancing faster than in the United States. Pressure for higher prices in Latin America generally has been intensified by the shipping shortage, by the difficulty of importing many types of goods and by dollar exchange derived from heavy United States purchases of strategic materials. The inflow of dollars is inflationary because the dollars are converted into domestic currency and therefore there is more money available to buy goods.

"Speculation for higher prices, with sellers charging all the traffic will bear, has resulted in a disproportionate rise in prices of scarce imported goods, especially manufactured goods imported from the United States.

"Generally, in view of the United States control over prices of goods moving into export channels, prices charged for these goods in South America should not be more than 20 to 50 per cent higher than the cost to consumers in the United States. But in some places, prices for these goods have been run up 200 per cent or more.

"In some places, goods which formerly moved through only one or two hands enroute to the final consumer in the past year have been moving through three or four hands. This has resulted in additional layers of distribution expense and profits, reflected in the higher prices charged to the final purchaser.

"Clearly one of the most effective means of combating this cycle of price raising is to keep additional middlemen from moving into the distribution and to eliminate new ones who have come in during the war.

"Throughout Latin America extensive price controls have been adopted to meet varying needs of the individual countries. The Americas have much to gain by studying these controls and profiting by the lessons of neighboring countries.

Hughes Resigns WPB

• • • **The resigna** of Hugh Hughes as director of the WPB Commodities Bureau, eff ctive Aug. 21, has been accepted with regret by WPB operations vice-chairman Hilard G. Batcheller

Do You Know That---

There's a special Wyandotte Metal Cleaner for the anodic cleaning of bearings prior to silver deposition?

This special Wyandotte Product *contains no silicate,* rapidly removes carbon smut, and is free rinsing. Users tell us "that it leaves an ideal surface for silver strike."

Details regarding the use of this Wyandotte Product for cleaning prior to plating silver on bearings will be sent to you promptly.

There is a specialized Wyandotte Metal Cleaning and Degreasing Product for every war production metal cleaning job. Located near you is a Wyandotte Field Engineer with a wealth of "know how" about metal cleaning, that is yours for the asking.

WYANDOTTE CHEMICALS CORPORATION
J. B. FORD DIVISION — WYANDOTTE, MICH.

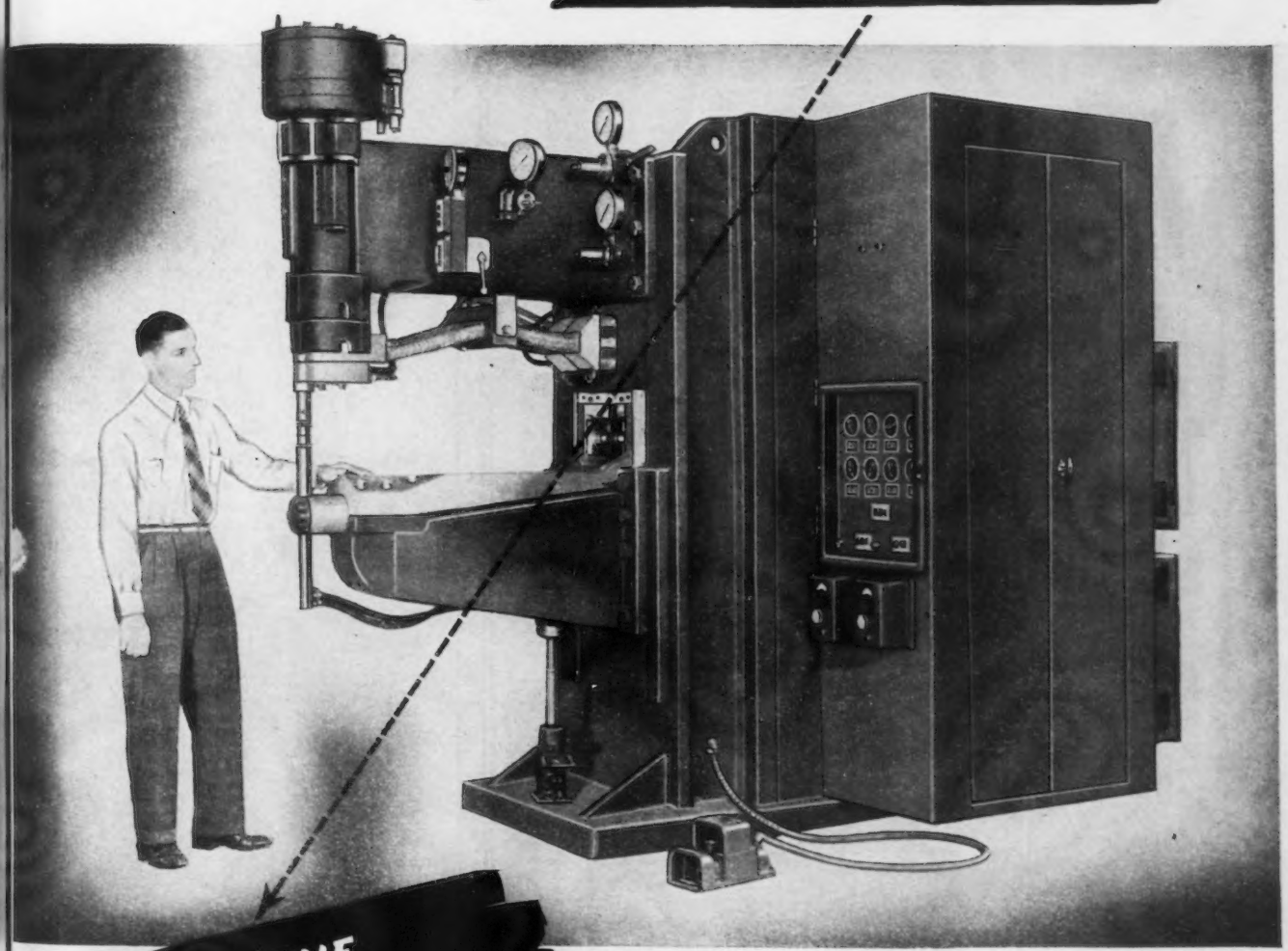
Wyandotte

SERVICE REPRESENTATIVES IN 88 CITIES

** Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and the J. B. Ford Company to better serve the nation's war and post-war needs.*

HELPING TO SOLVE TODAY'S WARTIME PRODUCTION PROBLEMS

Heavy structural parts on big bombers are now being SPOT WELDED!



...ON THE WORLD'S LARGEST SPOT WELDER

TH.S HUGE MACHINE, weighing nearly 19 tons, is successfully accomplishing one of the most difficult of welding processes: that of spot welding aluminum and other light alloys in the heavier gauges. Aircraft manufacturers are taking advantage of this development by speeding the fabrication of beams and other heavy structures. In some cases, this process is even efficiently replacing extruded structures.

The 240 KW machine illustrated (Type PMCO.5S-1) operates on the electro-magnetic Stored Energy Principle and incorporates the Sciaky Variable Pressure Cycle. Capacity for aluminum and other light alloys or corrosion resisting steels is thicknesses of from .040" plus .040" minimum up to and including .187" plus .187" maximum. This machine is capable of welding 40 spot welds per minute on two thicknesses of .040" light alloys. Maximum pressure, when both cylinders are operated at constant, 12,000 lbs.

SCIAKY BROS.

Manufacturers of a Complete Line of A.C. and D.C. Electric Resistance Welding Machines.

4915 W. 67TH ST. · CHICAGO, ILLINOIS

Q & A on OEW's Decentralization

Washington

• • • **The Office of Exports** of OEW has issued Current Export Bulletin No. 113, containing supplemental questions and answers on decentralization procedure. Exporters have submitted many questions and suggestions; those of broad application appear below. ("I. R." refers to Import Recommendations.)

What should the exporter do with an I.R. covering an order which has already been licensed?

(a) If for allocated materials or CMP products, he must return copy No. 4 to OEW for cancellation. Allocated materials and CMP products were listed in Bulletin 104.

(b) If for materials not listed in Bulletin 104, he may get a new order and file a new license application; otherwise the I.R. should be sent to OEW for cancellation. However, if more than 60 days have elapsed since the issuance of the I.R., it may not be used for this purpose and must be returned to OEW for cancellation.

May an exporter file more than one license application for one I.R.?

Yes, but all such applications should be submitted at one time. If this is impossible, he should write OEW that he will apply later for the remainder, at which time it will be necessary to give the I.R. number.

Is an I.R. necessary for gift shipments and for personal effects not under General License?

Yes.

Are I.R.'s required for licenses issued prior to the effective date of Decentralization?

No.

Where it is stated in the I.R. that shipment is to go by rail, water or otherwise, is it controlling?

No, it is merely a recommendation.

Where an I.R. is issued for materials in the customary export containers, is an I.R. needed for the containers?

No.

If an I.R. is received near the end of a quarter too late to submit before the end of the quarter, may it be used

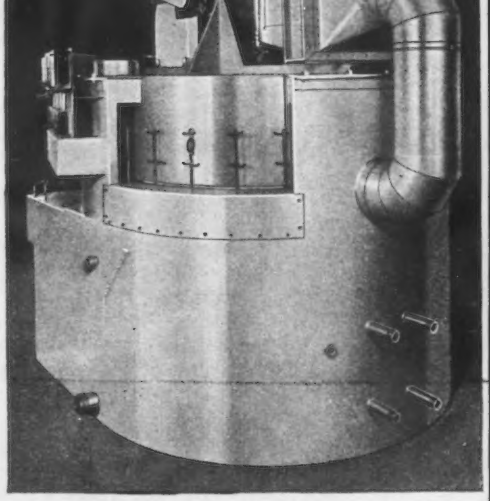
New!

SENSATIONALLY SUCCESSFUL!

RANSOHOFF *ROTOMATIC* CLEANING MACHINE

wash . . . rinse . . . dry

ONE of the most practical, time-saving, labor-saving, *space-saving*, cost-saving pieces of equipment ever designed! *It's* positively *a three-way short-cut to better cleaning . . .* and takes up a mere 7'6" x 6'6" space.



Here's how it handles your works:

1. **hang work on fixtures**

or

2. **work is cleaned in a series of pivoted rotating baskets which are loaded and unloaded automatically**

or

3. **place work in removable baskets placed on the revolving table**

All bearings and the driving mechanism are mounted on top of machine and do not come in contact with the cleaning solution.

Write for details TODAY.

N. RANSOHOFF, Inc. 1315 Township Ave. CINCINNATI, O.

RIVETING MACHINE: Air operated riveting machine on a nacelle door in the Inglewood plant of North American where "Billy Mitchell" bombers and "Mustang" fighter planes are made.

"ARMOR PLATE IS APPLE PIE FOR THE POR-OS-WAY WHEEL"

Dear Charlie:

Here I am at the [redacted] plant. You told me to get the story on Por-os-way. Here it is – and it's a honey. Grinding the edges of armor plate is a tough assignment for any wheel. And these edges are case hardened because they're torch-flame cut. You can see for yourself armor plate is apple pie for the Por-os-way wheel. Por-os-way is way out in front of the previous wheel used.

Your roving reporter

"Vic"

writes POR-OS-WAY'S War Plant reporter

THE RESULTS	POR-OS-WAY WHEEL	FORMER WHEEL
Number of pieces per hour, 4 sides per piece including setting up time	5	2
Wheel dressing required	None	Every 6 or 7 pieces
Life of Wheel	4.5 days (108 hrs.)	½ day (12 hours)
Average depth of cut per pass	.008" to .125"	.006" maximum
Speed of removal for 30" of edge	2 minutes	20 minutes
Number of passes required	7	15
Time per pass	2½ seconds	4 seconds (wheel chipped at faster speeds)
Number of man-machine hours per month, 3 men on 3 machines; 8 hours, 3 shifts, 30 days per month	2160	
Number of pieces finished (4 sides) per month—including setting up time	10800*	4320
Monthly increase in production through use of Por-os-way Wheel	**6480** pieces	2½ times more than previously

THE JOB:

Removing average of 1/4" stock from all four edges of 1/2" and 3/4" armor plates, consisting of mild steel one side, hardened steel (600 Brinnell, 35-37 Rockwell) on the other. Torch cutting case hardens the edges. Three Rogers grinders used.

THE WHEEL:

Por-os-way segments — 4 1/8" x 1 1/4" x 4" A24KV2.

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent.

WRITE for complete booklet "Facts About Por-os-way". The address is 434 Wheatland St., Phoenixville, Penna.

*Por-os-way actually removed stock 10 times faster than previous wheel but inclusion of setting up time, being a proportionately large factor, reduces ratio to 5 to 2.

2 TO 5 TIMES MORE WAR PRODUCTION PER MAN PER MACHINE

POR-OS-WAY*

a new RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH, CLEVELAND, DETROIT, LOS ANGELES

PHOENIXVILLE, PENNA.
Western Gateway to VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.

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after expiration of the quarter?

Yes, an application covering the I.R. should be filed within sixty days of the date of issuance; if it is too late to charge in the current quarter, OEW will try to charge it to the next quarter.

Can an I.R. be used by several applicants for licenses?

Yes; however, if a license application is to be filed by a person not named in the I.R., it must be accompanied by a letter of explanation showing approval of use by the holder of the I.R. and the importer. Every effort should be made to submit all the applications at one time. If any of the applications for licenses are sent in without the I.R., they should be accompanied by a letter stating the I.R. number.

Can incorrect Schedule B numbers be changed on the I.R.?

No. Do not alter the I.R. but give the correct number on the license application. The Office of Exports will assume the responsibility of advising the Country Agencies of the change in Schedule B numbers so that proper adjustment may be made in the allocation accounts.

If the holder of an I.R. is unable to supply the entire quantity, may another exporter make application for the balance?

Yes, preferably both applications should be sent in together. If this is not possible, the applicant for the first license should notify OEW at the time of making his application that another application will be submitted by another exporter.

After exporter A receives an I.R., the importer cables exporter B asking him to ship the goods affected. May exporter B apply for license?

Yes, provided exporter A transfers the I.R. to exporter B with the importer's approval. The license application from exporter B should be accompanied by the I.R. and a letter or cable from the importer.

Where there is variation between units of quantity, weight or value shown on the I.R. and those shown on the importer's order, what determines the amount to be shown on the license application?

The amount is controlled by the units used in Estimates of Supply for the commodity. A list will be issued shortly of commodities for which estimates of supply have been given to the countries of destination with the accounting units used. The application should not cover a greater quantity than is indicated on the I.R. If weight is controlling, a license ap-

Features of 15 Cans Used for Sea Signal

New York

• • • Features of 15 different containers were used to produce the can for the newest daytime distress signal for castaways at sea, according to the American Can Co., producers of the container.

..The signal, a cloud of rose-colored smoke, is visible five miles from the ship or shore and up to 8000 ft. from the air, government tests have proved.

Upon removal of a screw cap from the top of the container, the castaway jerks a ring lying beneath it and the chemical is automatically ignited. The signals are now standard equipment for all life-rafts and lifeboats coming under jurisdiction of the U. S. Coast Guard and Maritime Service.

Pre-Inspected Forgings

REDUCE CHECKING DETAIL AND GAIN TIME

It is not unusual to check ten and pass ten, when checking T & W Forgings. The reoccurrence of this experience establishes confidence in the merit of T & W Forgings and in the integrity of T & W inspectors. This confidence in turn permits a reduction in your checking detail, avoids delays and reduces your expense of checking to a minimum. The absolutely safe rule in checking forgings, of course, is to check ten out of ten, but it is often practical to check one and pass nine. A T & W Forging Engineer knows how to gain time with pre-inspected forgings.

T & W FORGINGS USUALLY COST LESS AT THE POINT OF ASSEMBLY

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION · ALLIANCE, OHIO

Sales Offices in New York, Philadelphia, Chicago, Indianapolis, Detroit and Cleveland

"No Skin off MY Knuckles... AND NO SCARS ON MY WORK...

since I've been driving AMERICAN PHILLIPS SCREWS"

In plants where assemblies are made with American Phillips Screws, industrial clinics could all be closed, as far as screw driver slashes are concerned. Accidents can't happen, either to workers or their work, because the Phillips Driver remains firmly engaged in the Phillips Recess until the screw is set up straight and tight. Driver can't slip out of the screw head . . . so there's no danger of lost-time accidents, or rejects because of gouged work-surfaces.

And American Phillips Screw Driving is as swift and simple as it is safe. No fumbling at the start, no crooked driving, no hard work and fatiguing nervous strain. One hand aims the Phillips Driver while the other hand holds the work, and that's all there is to it. Unskilled help gets skilled results right from the start . . . often doubles the production of workers using slotted screws . . . and cuts assembly costs in half.

American brings you these advantages of Phlllips fastening . . . plus the advantages of American's piece inspection system, prompt service, and reliable engineering aid on any fastening problem. That's why so many Phillips Screw buyers specify: "AMERICAN".

AMERICAN SCREW COMPANY
PROVIDENCE, RHODE ISLAND
Chicago: 589 E. Illinois St. • **Detroit: 5-267 General Motors Bldg.**

WORLD'S EASIEST, FASTEST, SAFEST METHOD OF PRODUCTION SCREW DRIVING

American makes a complete line of Phillips Recessed Head Stove Bolts (shown), Machine Screws, Wood Screws, and Hardened Self-Tapping Sheet Metal Screws (Types A, C, and Z). Stove Bolts are now packed in a partitioned package which keeps bolts and nuts separate, ready for immediate use.

plication will be considered even if there is a discrepancy in price; however, prices must be within OPA ceiling. If the dollar value is controlling, the value on the license application must not exceed the value on the I.R. even though this necessitates a change in weight or other unit. Gross weight is never controlling.

When an application is filed at the maximum export price which is considerably higher than stated in the I.R., will OEW consider the application?

Yes, so long as the price stated in the application is within the limits specified in the current maximum export price regulations.

Will consideration be given to applications without I.R.'s which were "cased in" before the effective date for Decentralization, especially applications which were returned without action to be resubmitted after the effective date of Decentralization?

Cases returned without action prior to the effective date of Decentralization will, on resubmission, require an I.R. excepting hardship or emergency cases. Cases rejected prior to the effective date of the plan may be appealed without an I.R.

Is it true that in certain countries the Country Agency will grant an I.R. only upon confirmation from the supplier under which the supplier commits himself to deliver the goods?

No such commitment is required for the issuance of an I.R. (Some countries further require Exchange Permits or Import Licenses before materials may be imported. Prior to issuing these documents these countries sometimes request evidence that a U. S. Export License exists.)

When an I.R. has been issued, is it necessary to obtain an import permit from countries where such permits are required?

Yes. The two documents are not related.

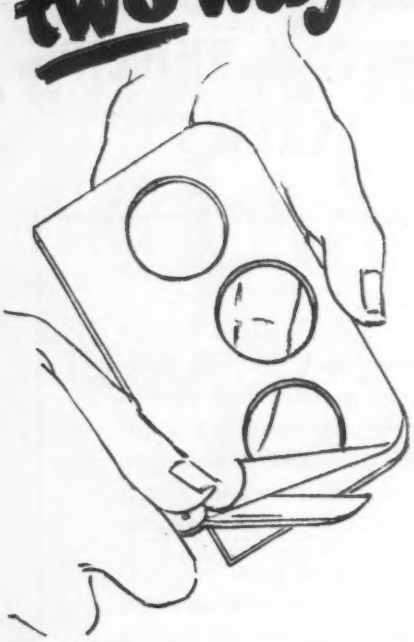
If the exporter receives an I.R. which he does not wish to use, what shall he do with it?

He may transfer the I.R. to another exporter with the approval of the importer; otherwise he may send the I.R. to OEW for cancellation, or return the I.R. to the importer and write to OEW that he has done so, giving the I.R. number.

What is the time limit for submitting I.R.'s to OEW?

I.R.'s must be submitted within sixty days from the date of issue. However, I.R.'s may be submitted later provided an accompanying letter is sent fully justifying the delay.

accuracy two ways



REPLACE skill-wasting methods with quick precision while insuring accuracy of fit. Use Laminum shims to provide correct adjustment in both shop assembly and field service.

Shims cut to your specifications. Stock shim materials obtainable from your dealer. Write us for further information and shim application chart.

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76 Union Street • Glenbrook, Conn.

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THE SOLID SHIM THAT peels FOR ADJUSTMENT
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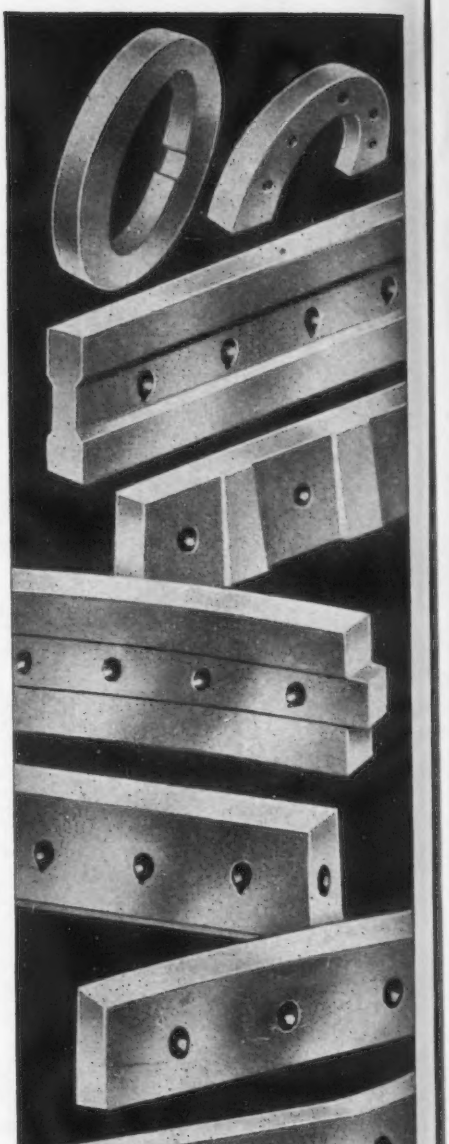


Greater Tonnage Per Edge of Blade

AMERICAN SHEAR KNIFE CO.
HOMESTEAD · PENNSYLVANIA

WPB Clarifies Order Placement When Suppliers Can't Be Found

Washington

• • • **A special guide** to assist in placing orders for controlled materials, particularly when a supplier cannot be found, has been released by the Education and Inquiry Branch CMP Division of WPB.

Any person or company who is entitled to place an authorized controlled material order for steel, copper, or aluminum (shapes and forms), and is unable to find a producer or supplier of this material, should make use of the following suggestions:

Check "Recovery" Branches Material Lists.—Numerous persons have been able to obtain material to fill their controlled material orders through the recovery branches. These branches maintain national inventory records of available materials and act as clearing houses for manufacturers who have listed excessive inventory.

Steel Recovery Branch—Mr. G. R. Link, Chief, 5835 Baum Boulevard, Pittsburgh.
Or: Materials Redistribution Representative in local WPB Offices.
Copper Recovery Branch—Mr. Morris Stein, 200 Madison Avenue, New York.
Aluminum Division—Mr. Carl H. Burton, Tempo R Bldg., Rm 2 334, Washington, D. C.

Try as Many Producers and Suppliers (Warehouses) as Practical.—Manufacturers receiving allotments for authorized production schedules should place their orders for materials and parts as far in advance of required receipt as possible. If it develops that you are unable to place your authorized orders on your regular sources of supply, so that materials may be received in time to meet your authorized production schedules, try other producers and suppliers.

Note—You might also request suppliers who are unable to take your orders to recommend other suppliers who may be in a position to accept them.

Advise your Prime Contractor, Claimant Agency, or Industry Divisions.—When you have exhausted the possibilities suggested above, advise the person from whom you received your allotment, whether contractor, Claimant Agency, or Industry Division. Do this as soon as possible, especially if your customer requested you to come to him for help. He may be in a position to recommend a satisfactory solution. (See Listing I.)

Check with local WPB Office.—Inasmuch as the local WPB Office is probably familiar with the materials situation in your area, it is suggested that you contact there in attempting to find a supplier for your order.

Contact WPB Controlled Materials Divisions.—Only if necessary.

CLAIMANT AGENCIES

War Department—Contact the officer from whom contract was received. If you are a sub-contractor, request assistance of your customer. If necessary consult the nearest procurement office that procures the end product.
Navy Department—Consult the officer or technical desk allotting the contract. Naval Inspectors may be of assistance.

	Person	Phone	Address
Maritime Com.			
Steel	Neil W. Wyndham	Exec. 3340, Ext. 403	Comm. Bldg., Washington, D. C.
Copper and Aluminum	R. K. Stoner	Exec. 3340, Ext. 1044	Comm. Bldg., Washington, D. C.
Aircraft Resources Control Office	Administrator, ASU	Kenmore 7111	Wright Field, Dayton, Ohio
Office of Lend-Lease	Warren B. Shipway	Re. 7500, Ext. 73397	515 22d St. NW., Washington, D. C.
Economic Warfare			
Exporters Service	John G. Montag	Exec. 7030, Ext. 2008	Rm. 1324-Tempo U, Washington, D. C.
Metals and Minerals	Harold R. Stephan	Exec. 7030, Ext. 662	Rm. 2204-Tempo U, Washington, D. C.
Department of Agriculture	Theodore Sweet	Rep. 4142, Ext 3136	1417 So. Inter. Bldg., Washington, D. C.
Office of Defense Trans.	A. B. Cole	Rep. 7500, Ext. 72358	2117 ICC Bldg., Washington, D. C.
Office of Rubber Director	H. H. Rockwell	Rep. 7500, Ext. 75982	4032 Municipal Bldg., Washington, D. C.
Petroleum Adm. for War	F. A. Watts	Rep. 1820, Ext. 4623	1444 New Inter. Bldg., Washington, D. C.
Office of War Utilities			
Communications	Harry F. Lowe	Rep. 7500, Ext. 74821	2202 New P. O. Bldg., Washington, D. C.
Power, Gas and Water	E. Eslick	Rep. 7500, Ext. 76879	2538 Tempo R, Washington, D. C.
National Housing Agency			
Private War Housing—Contact local FHA Office.			
Public War Housing—(a) F. P. H. A. and new construction—see contracting officer of government agency. (b) HOLC conversions—see local representative of HOLC.			

INDUSTRY DIVISIONS

Contact the Controlled Materials Officer in the appropriate Industry Division.

LISTING II

PERSONS TO CONTACT IN WPB CONTROLLED MATERIALS DIVISIONS

STEEL

Material Type	Person	Phone (Republic 7500) Extension		Address
Cold Finished Bars	H. D. McQuown	74656	1512-A	SSB**
Alloy Steels	J. F. Reid, Sr.	73037	1522-A	SSB
Forgings and Castings:				
Steel Castings	B. L. Weaver	71575	1308	SSB
Rolled Armor Plate; Wheels, Tires and Axles	H. W. Davidson	76076	1418	SSB
*Drop and Upset Forgings	H. W. Schoen	3016	1418	SSB
*Heavy Forgings	A. A. Ohmer	76076	1418	SSB
Hot Rolled Bars and Semi-Finished Steel	D. M. Schmid	3138	1412	SSB
	E. P. Galleher	71178	1414	SSB
Shell Steel	G. V. Eads	72418	1414	SSB
Pipe (Steel)	D. K. Miller	73035	1417-A	SSB
Plates	A. L. Meyer	71604	1304	SSB
Plates	W. A. Bossert	75896	1309-A	SSB
Plates	F. T. McCue	73616	1311	SSB
Shapes (Structural)	R. A. Marble	71146	1304	SSB
Shapes (Structural)	R. F. White	73977	1410-A	SSB
Shapes (Structural)	H. B. Miller	2501	1412-A	SSB
Rails (track accessories)	R. M. Thulean	71950	1009	SSB
Sheet and Strip	W. J. Bloom	73036	1425-B	SSB
Sheet and Strip	M. M. Chapman	75207	1425	SSB
Sheet and Strip	W. R. Nolan	2974	1425-B	SSB
Stainless Steels	P. E. Floyd	71456	1415-B	SSB
Tin Plate	J. T. Nichols	3874	1424	SSB
Tools Steels	J. P. Larkin	3591	1413-B	SSB
Tubing	G. H. Root	3424	1415	SSB
Wire Rods, Wire and Wire Products	N. J. Froelich	73940	1520-A	SSB
	E. V. Wilkins	76407	1516-B	SSB

* Forgings are Class "A" Products.
** Social Security Building.

COPPER

Material Type	Person	Phone (Republic 7500) Extension		Address
Brass Mill Branch:				
Alloy Rod	H. L. Angel	5611	1747	Tempo R*
Alloy Tube; Commutator Copper	S. J. Carroll	5611	1749	Tempo R
Alloy Sheet and Strip; Beryllium Copper	W. L. Ashlock	71389	1737	Tempo R
Warehouses-Brass Mill	L. C. Chew	73500	1755	Tempo R
Copper Products (CMP)	C. O. Brudin	2828	1753	Tempo R
Copper Wire Mill Branch:				
Wire Mill Products (CMP)	C. V. McKay	2372	1736	Tempo R
Wire Mill Production	W. F. Jessup	76825	1736	Tempo R
Wire Mill Warehouses	Ed. Maynard	369[illegible]	1736	Tempo R
Foundry	Wm. Meissner	71320	1628	Tempo R
Conservation	I. J. Ralph	74520	1635	Tempo R

ALUMINUM

Castings	Fredrick Ayer	3770	2222	Tempo R
Sheet, Strip, Plate and Foil	E. A. West	73148	2209	Tempo R
Extruded Shapes	David Evans	71589	2219	Tempo R
Rod, bar, and rolled structural shapes	C. H. Burgess	6880	2204	Tempo R
Wire and Rivets	R. E. Chloupek or T. E. Boeger	6231 2177	2210	Tempo R Tempo R
Ingot and Powder	T. W. Bingham	73087	2225	Tempo R
Tubing and Pipe	H. C. Wilson	73166	2207	Tempo R
Forgings, pressings, and impact extrusions	R. K. Beck, (Alum. & Mag. Div.-WPB)	Hem. 7111 Ext. 22153		Wright Field, Dayton, Ohio
Other products	L. H. Davidson	3910	2017	Tempo R
Warehouse Section	T. E. Boeger	2177	2210	Tempo R

* Tempo R—Temporary R Building.

READ WHAT

George E. O'Neill
Safety Engineer of Bendix
MARINE DIVISION

THINKS ABOUT SPEEDI-DRI

OIL AND GREASE ABSORBENT

Writing to the Editor of a safety magazine, Mr. George E. O'Neill, Safety Engineer of the Marine Division of Bendix Aviation Corporation, says, in part: "Oil absorption by the use of sawdust . . . is both unsanitary and inflammable, creating a great fire hazard. Prior to the use of SPEEDI-DRI we risked this unhealthy condition but now our floors and platforms are kept continually clean with SPEEDI-DRI. I believe that facts about products of this nature should be passed on to others . . ."

Mr. O'Neill might also have added that SPEEDI-DRI provides an immediate, non-skid surface, soaks up oil and grease from wood, steel, or concrete floors, brightens up the plant, saves shoes from oil rot, protects workmen's feet and is especially effective where women are employed. By its ease of application and removal, SPEEDI-DRI saves vital manpower and cleaning costs. No expensive machinery or scouring compounds are necessary.

Thousands of plants are now using SPEEDI-DRI in preference to all other oil-absorptives, because it gives more protection per pound at less cost.

Try SPEEDI-DRI in your plant. It will work wonders for you. Prompt service from warehouse stocks in leading cities. Unlimited, priority-free supply.

Ask for a demonstration . . . or write for a free, testing sample. If you use water-soluble oils or if water is also present, specify SOL-SPEEDI-DRI.

SPEEDI-DRI
OIL AND GREASE ABSORBENT

SUPPLIERS

East — **REFINERS LUBRICATING CO.**
New York 1, N. Y.

Midwest and South
WAVERLY PETROLEUM PRODUCTS CO.
Philadelphia 6, Pa.

West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Russ Bldg., San Francisco 4, Calif.

Freight Cars Due For Program Step-Up

• • • **There should be a stepping up in the production of railway freight cars, if the producers are able to make good on the controlled materials definitely allocated for the fourth quarter of 1943 and the first quarter of 1944.**

The fourth quarter allotment would produce 5,801 cars, but that number may be augmented by the output of August and September, the returns for which are not yet all in.

Material allocated for freight car production during the first quarter of 1944, it is said, would make an output of 9,570 cars possible.

DPC Buys Fort Pitt Bridge Plant for War Work

Massilon, Ohio

• • • **The purchase** of the Fort Pitt Bridge Works at Massilon, Ohio, by the Defense Plants Corp., was announced recently. The plant will be turned over for operation to the Canton Drop Forging and Mfg. Co., This placed the last large idle factory property in this region into production.

A $4,000,000 appropriation was authorized for the purchase and renovation of this plant, much of which will be used in reconditioning and remodeling the plant, and in purchasing necessary equipment. It was stated that 60 per cent of the machinery needed for operation of the plant has been purchased and awaits delivery.

When placed in production, the plant will be used in the manufacture of aluminum forgings and aluminum aircraft motor cylinder heads, the bulk of which will go to Wright Aviation Corp.

The newly purchased property has been idle for the yast year, when the Fort Pitt Company moved its operations to plants in Pittsburgh and Canonsburg, Pa.

Ordnance Plant Being Closed

Buffalo

• • • **Machinery and equipment** usable in other plants is being removed from the $27,000,000 Lake Ontario Ordnance Works near Niagara Falls, which recently closed down after ten months of producing TNT for the Army. The plant is not being dismantled, however, and stands ready to go into production again if war demands necessitate.

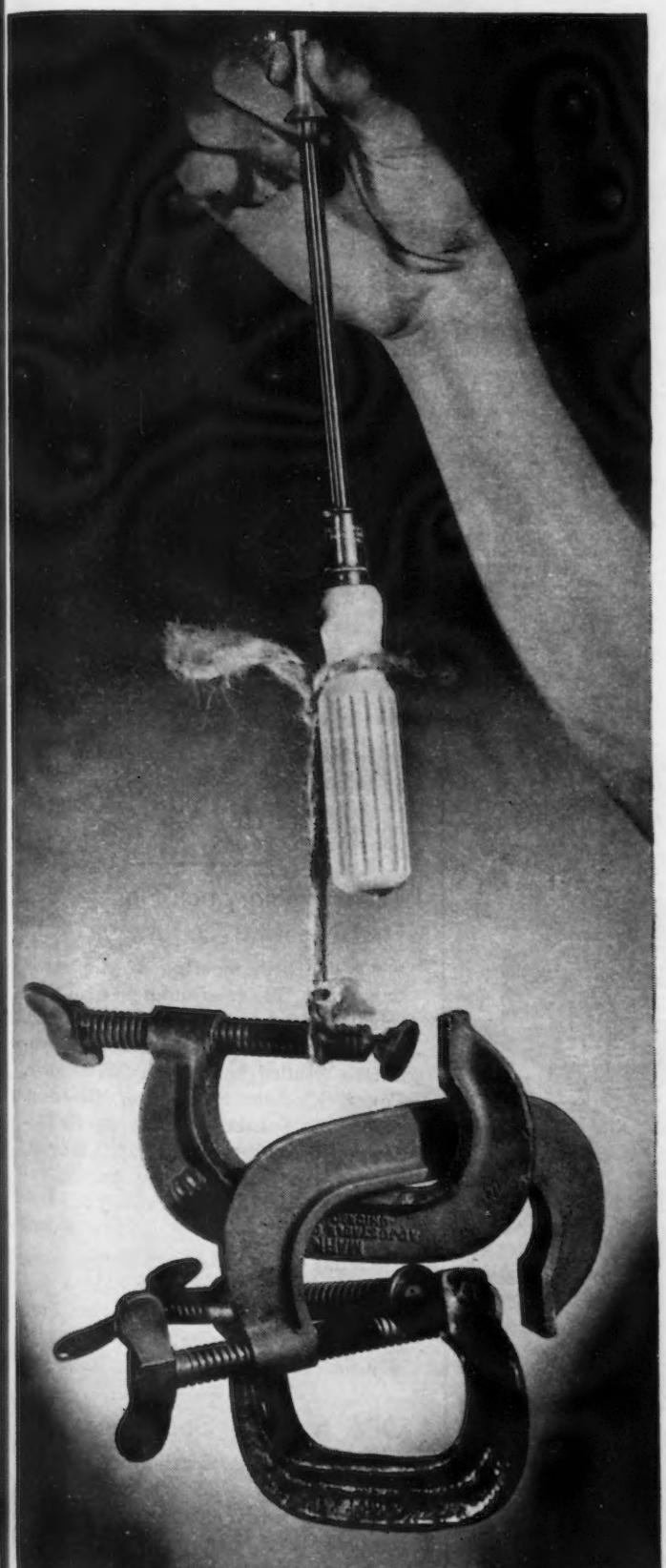
BUY BONDS
with
what you save in
time, labor and worry
from the use of

CLARK
BOLTS & NUTS

May we
co-operate
with
you
?

CLARK BROS BOLT CO.
Since 1854
MILLDALE, CONN.

...It's no trick at all



with this powerful CLUTCH HEAD "lock-on" feature to liquidate the problem of hard-to-get-at spots . . . to free slowed-down assembly from fumbling with human or "mechanical" fingers and dropping screws. A simple reverse turn of the driver in the Clutch locks screw to bit as a unit for fast and certain one-handed driving from any angle. Frankly, the iron clamps were added to emphasize the tenacity of the hold . . . yet, the lock is instantly released by the normal turning of the screw for the drive home with hand or power driver.

Many assembly lines operating in the war effort have found that this is just one of several factors contributed by CLUTCH HEAD SCREWS *alone* towards better and lower cost production. They have found that the combination of deep Clutch and self-centering bit smooths out hesitation, eases the fatigue load, and establishes confidence against slippage. They have found time and money economy also in the sturdy construction of the Center Pivot Assembly Bit with its longer uninterrupted "spell" in operation . . . plus its longer total life through briefly grinding the end surface to restore maximum efficiency as needed. Add to these, the fact that CLUTCH HEAD SCREWS *operate with an ordinary type screwdriver* . . . so important when it comes to emergency service in the field.

CLUTCH HEAD SCREWS are available in Standard and Thread-forming types for every purpose. Their unusual advantages have won recognition in many phases of wartime service.

United invites your inquiries.

UNITED SCREW AND BOLT CORPORATION

CHICAGO CLEVELAND NEW YORK

Increase Labor Supply By Reducing "Quit Rate"

• • • **That a bird in the hand** is worth two in the bush, and that it is management's responsibility to keep the worker who has been hired was pointed out by Ray M. Hudson, Regional WPB Deputy Director of Special Services, in a recent discussion concerning the rapidly mounting "quit rate" which is aggravating man-power shortage problems in some New England war plants.

If a worker is happy, he will not quit so readily, and if a company follows the procedure employed by the Kaiser Shipyards and many other progressive companies, to find out why a worker wants to quit—and then takes steps to remedy the situation—a company can reduce its labor turnover by a worthwhile percentage, Hudson stated.

Quitting is frequently the result of unsatisfactory personnel relations, and a positive approach to the problem by management was recommended by Hudson. Important steps in keeping with this suggestion, according to him, are:

(1) An adequate employment interview. Tell the new worker what the company is making for the war effort and what his operation contributes to the whole. Wages, hours, working conditions, promotion policies should be explained. Large companies use simple, illustrated booklets for the purpose. (A smaller company could have mimeographed sheets printed inexpensively.)

(2) Training—often new employees are apprenticed to workers who know their jobs but can't teach them. Organize your training program on an efficient basis by utilizing such services as War Manpower Commission's Job Instructor Training.

(3) A regular system of promotion and upgrading.

(4) Check facilities for housing, feeding, transportation, recreation, care for children of working mothers. If existing ones are inadequate, provide your own.

(5) Provide adequate lighting, ample safety equipment, clean washrooms. Remove causes of little dissatisfactions that add up to big resentments and labor turnover.

(7) Establish Labor-Management Committees, and give them a hand in handling such problems.

International News Photo

AIRBORNE JEEP: Demonstrating the efficiency of gliders and airborne troops, a jeep is driven out of the raised nose of the silent aircraft even before the dust of the glider's "belly" landing had settled.

Texas Foundrymen Plan First Meeting October 29

• • • **The first meeting** of the newly organized Texas foundry group is scheduled for Houston on October 29, according to the organization committee headed by F. M. Wittlinger, Texas Electric Steel Co., Houston. The guest speaker will be R. G. McElwee, Vanadium Corp. of America, Detroit, chairman of the cupola research project of American Foundrymen's Association.

Arrangements also are being made to have a second meeting held a day or two later at either Dallas or Fort Worth, so as to give other foundrymen an opportunity of attending.

OPA to Hold Coal Prices

• • • **With the expiration** of the Guffey Coal Act, the OPA said it already has taken over enforcement of bituminous coal maximum price regulations, a work formerly performed for OPA by the Bituminous Coal Division of the Department of the Interior.

"R-C" POSITIVE DISPLACEMENT BLOWERS

—will handle more air per horsepower, and with less upkeep, than any other type of blower.

PLAN NOW— TO SAVE TIME, LATER

For the duration, Roots-Connersville production is dedicated to the job of "making it hot for the axis". Even though wartime restrictions may defer certain improvements involving new equipment, we shall be glad to work with you now on future plans. Some helpful bulletins are available on request.

ROOTS-CONNERSVILLE BLOWER CORPORATION
309 Ohio Ave., Connersville, Ind.

POSITIVE DISPLACEMENT moves more air

MODERATE SPEED means less wear

"R-C" Rotary Positive Cupola Blower installed in a mid-Western foundry. Capacity 2,700 CFM, 20 oz. pressure; 484 RPM.

Roots CONNERSVILLE SINCE 1854 Positive Displacement CUPOLA BLOWERS

Magnesium Casting Practice

(CONCLUDED ON PAGE 57)

Magnesium may be compared to manganese bronze and similar alloys with regard to molding technique; like these alloys turbulent pouring recreates oxide. In the case of manganese bronze it is aluminum oxide which is formed of course, and in the case of magnesium it is magnesium oxide. For this reason and also to prevent any flux being carried into the casting, bottom pouring is frequently resorted to and even, as in manganese bronze again, a horn runner is sometimes used. Another practice in connection with this trouble is to divide the downgate. The metal is therefore poured into a pouring cup, from where it is conveyed to a sump near the base of the casting in three or four streams. This method helps to cut down turbulence. Other and more conventional methods of pouring are used as well, but the practice described is general, especially for larger castings. Occasionally where circumstances require very thorough feeding an additional ingate is arranged for nearer the top of the casting.

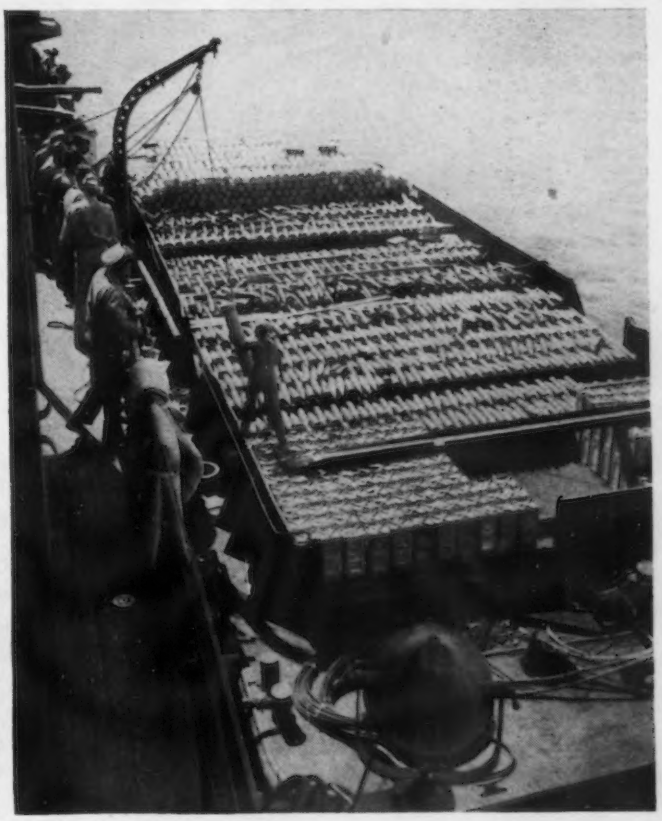
In large castings particularly, chills are frequently used in the molds, and great care must be taken to see that condensation or other moisture does not form on these. It is necessary, therefore, to use a good chill dressing, of which there are a number of good proprietary makes on the market. These dressings usually have a self-evaporating base, such as petrol, carbon tetrachloride or methylated spirits, insuring that a good coating can be applied moisture free.

In the case of the mold and cores, a dressing with a water solvent is sometimes used, and in such cases care should be taken by torching or similar means to see that the affected surfaces are quite dry. Sulphur is usually dusted on these surfaces as well.

Melting Pot

Mild steel pots are used for melting magnesium, as there is a tendency for magnesium to react with the silicon in the plumbago type usually used in nonferrous work. Gray iron pots are not used, as it is found that they also do not stand up to requirements sufficiently well. When these pots are lifted from the furnace great care should be taken to carry them steadily to the mold, and pouring should be carefully controlled. At the commencement of this operation, the flux should either be skimmed right off the surface or held back from the lip of the pot, and the exposed surface of metal dusted with flowers of sulphur to form some kind of protective cover for the metal in transit. It is wise not to pour the whole of the contents of the pot as the flux, having absorbed magnesium oxide in the washing stage and sunk to the bottom, may accidentally be poured into the mold. It is also important to remember thoroughly to clean out these residuals before re-using the pot, else the accumulated residue will certainly in part find its way into subsequent castings.

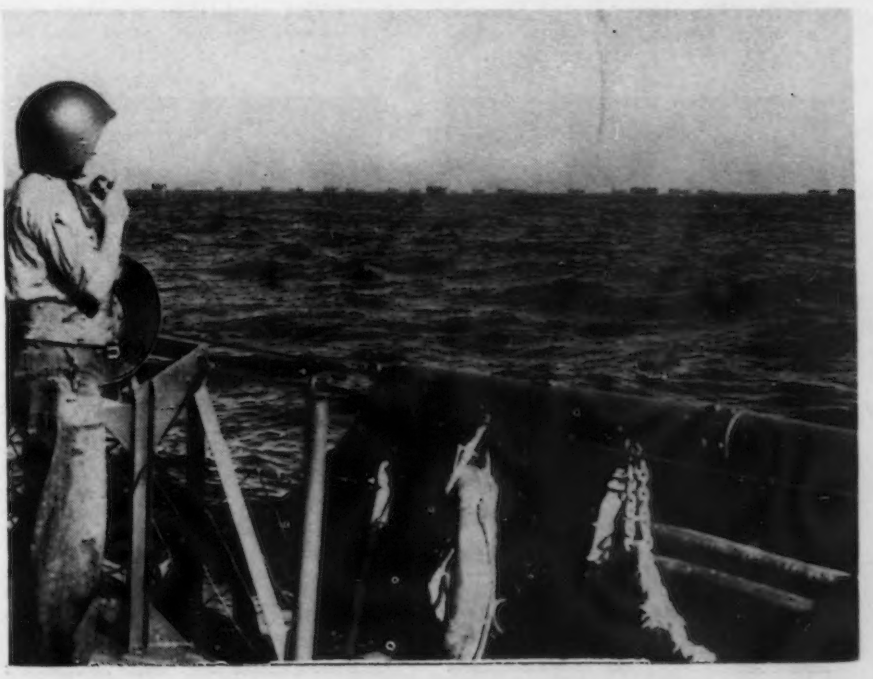
Press Association, Inc.



SHELLS FOR POUNDING JAPS: At an advance Allied base in the South Pacific, ammunition which will be used to fight the Japs is loaded on a barge. The projectiles are five and six in. shells, and the cases of ammunition are for anti-aircraft weapons.

° ° °

INVASION ARMADA: Fighting ships of the U. S. Navy and troop and fighting vehicle carriers pass in formation against the sky in the bright morning sun of "invasion day" as the gap between North Africa and Sicily was closed. There were 1500 U. S. Naval vessels in the armada.



PERSONALS

• **Fred F. Murray** has been elected president of the Oil Well Supply Co., subsidiary of U. S. Steel Corp. Mr. Murray succeeds **Benjamin F. Harris** of Pittsburgh, Pa., who resigned several months ago. Mr. Murray has been identified with the oil well supply business since early 1929, in which year he became vice-president of Wilson-Snyder Mfg. Co., of Pittsburgh, Pa. Wilson-Snyder was acquired the same year by Oil Well Supply Co., with Mr. Murray being elected vice-president in charge of manufacturing. In 1936 Mr. Murray moved to Dallas as Oil Well's ranking vice-president.

FRED F. MURRAY, president of the Oil Well Supply Co., Dallas, Tex., subsidiary of United States Steel Corp.

Practically all of his business career has been in executive positions connected with the manufacture and sale of steel and other metal products. During the N.R.A. he served on advisory boards of three industrial organizations — laundry machinery, gasoline pump and centrifugal manufacturers. He was executive vice-president of American Machine and Metals, Inc., New York City, until 1937 and since 1940 has been president of the Vulcan Iron Works of Wilkes-Barre in complete charge of all operations. He is resigning the latter position to become president of Wickwire Spencer.

• **Clarence G. Stoll,** president of the Western Electric Co., has reached his 40th anniversary with the company. Mr. Stoll joined Western Electric in 1903 as a student apprentice. After a succession of promotions in the manufacturing department, he became vice-president in 1926 and was elected president in 1940.

• **J. H. Coffey**, vice-president and general manager, Cutting Tools & Gauges Ltd., Ottawa, has been appointed deputy Machine Tools Controller of the Department of Munitions and Supply.

• **C. T. Ruhf** was recently elected president of Mack Trucks, Inc. Mr. Ruhf joined the company in 1912.

He had been executive vice-president of the company since last January and prior to that time operating vice-president in charge of factories.

• **E. Perry Holder**, president of the Vulcan Iron Works, Wilkes-Barre, Pa., has been elected president of the Wickwire Spencer Steel Co. Mr. Holder succeeds **E. C. Bowers**, who has been connected with the company since 1911 and has been president since 1926. Mr. Bowers has resigned because of serious illness but will continue as a member of the Board of Directors. Mr. Holder will resign his position as president at Vulcan.

• **Siegfried Rosenzweig,** president of the Korfund Co., Long Island City, N. Y., has celebrated his 20th year of association with Korfund. He joined the company in 1923 as consulting engineer, vice-president and general manager. He became president and treasurer in 1928.

• **Ralph G. Rogers** has been made factory manager of the Evansville, Ind., plant, Republic Aviation Corp. Mr. Rogers is on leave of absence from the Servel Corp., of which he is general superintendent.

• **Rubert J. Lindquist**, vice-president and director of the Reynolds Metals Co., of Richmond, Va., since 1941, has joined Curtiss-Wright Corp. as vice-president in charge of finances. Prior to joining the Reynolds Co. Mr. Lindquist held several important govern-

C. T. RUHF, newly elected president of Mack Trucks, Inc., New York.

E. PERRY HOLDER, president of the Wickwire Spencer Steel Co., New York.

RUBERT J. LINDQUIST, vice-president in charge of finances, Curtiss-Wright Corp., New York.

RALPH C. STUART, manager of the Lamp Division, Bloomfield, N. J., Westinghouse Electric & Mfg. Co.

ment posts including the position of chief auditor of the RFC from 1932 to 1941. He was also a vice-president and director of the DPC and a director of the Rubber Reserve Co.

• **Ralph C. Stuart** has been made manager of the Lamp Division of Westinghouse Electric & Mfg. Co., with headquarters in Bloomfield, N. J.. Mr. Stuart, who has been with the Westinghouse for 25 years, came to the Bloomfield headquarters plant of the division in January, 1941, being transferred from the West Plant of the Canadian Westinghouse Co. at Hamilton, Ontario, where he had been manager from 1930 to 1941.

• **J. B. McOwen** has been appointed field metallurgical engineer for the New York, Long Island, northern New Jersey, and eastern New York State territory of the General Alloys Co., Boston. Mr. McOwen has had many years' experience in the design and use of heat and corrosion resistant castings at Cooper Alloy Foundry Co. and at General Alloys. **E. E. Whiteside** now represents General Alloys in the northern Ohio and northwestern Pennsylvania area, including West Virginia. He was formerly with Michiana Products Co. in a similar capacity. **Paul A. Ford** has been named to represent the company in the State of Michigan. He has had field experience in the fabrication and use of heat treating furnaces at Surface Combustion Corp. and Fabricated Steel & Engineering Co. **A. H. Valentine** is the company's new representative in the southern Ohio area, including Dayton, Columbus, Cincinnati, Hamilton and Springfield, and **R. W. Luzius** has been appointed California and Pacific Coast representative.

• **George D. Shaeffer** has been appointed chief engineer of Gar Wood Industries, Inc., Detroit. Mr. Shaeffer, previous to his present assignment, was chief engineer of the road machinery division.

• **David M. Aten** has joined the Quaker Chemical Products Corp. as a metal process engineer. Mr. Aten has for seven years been employed as a lubrication engineer for one of the major oil companies. He will represent Quaker Chemical in Indiana.

• **James L. Hagen** has been named district manager in Michigan for the Alloy Casting Co., Champaign, Ill. Mr. Hagen was formerly field engineer for the Park Chemical Co. He will make his headquarters at 1244 Maccabees Building, Detroit. E. W. Bock, for many years a metallurgical engineer with the E. F. Houghton Co. and the Park Chemical Co., has been appointed Alloy Casting's representative in Wisconsin and Minnesota. His office is at 2913 West Wisconsin Ave., Milwaukee.

• **W. S. Cowan,** for the past year automotive adviser to the Ordnance Department has been added to the Minneapolis staff of the Monmouth Products Co., Cleveland. He will cover National Automotive Parts Association warehouses for the company in Minneapolis, Des Moines, Omaha and Denver in addition to his activities in connection with Monmouth contracts with Army Ordnance and other military groups. **Edwin H. Busch,** who was formerly manager for the U. S. Gypsum Co. in San Diego has joined

GEORGE D. SHAEFFER, chief engineer, Gar Wood Industries, Inc., Detroit.

Monmouth as West Coast manager. He will be associated with Colyear Motor Sales Co.'s West Coast organization and will make his headquarters at Los Angeles.

• **Kurt W. Renson,** industrial chemist, has joined the Los Angeles laboratory staff of Turco Products, Inc.

• **Earl L. Ramsey,** manager of the Diesel Division, Ex-Cell-O Corp., Detroit, has joined the Automotive Division of the WPB.

• **Howard Howie** was elected president and general manager of Knoxville Iron Co. He succeeds **H. W. Van Benschoten** who has recently resigned. For the last several years Mr. Howie was associated with the commerce and chemical engineering departments of TVA.

OBITUARY...

• **Frederick P. Wessolek,** general superintendent of the Ohio Crankshaft Co., Cleveland, died July 28. Mr. Wessolek joined the company in 1920 as a machine operator. He was 56 years of age.

• **Wilmer H. Beinecke,** structural steel sales engineer for the Wisconsin Bridge & Iron Co., Milwaukee, died July 31. He had been with the company 20 years.

• **Lucius T. Carroll** former president of the Pacific Car & Foundry Co., Seattle, died in San Francisco.

• **Maynard S. Matteson,** author of several popular welding manuals and an instructor for the last 14 years at one of Milwaukee's boys technical schools, died August 10 at his summer home near Medford, Wis.

• **Clifford A. Lilley,** vice-president and general manager of George R. Carter Co., Detroit, died Aug. 14 after a short illness.

• **Edward W. Thomas,** who represented the Scott Valve Mfg. Co. for nearly 55 years in Detroit prior to retiring in 1939, died recently in Daytona Beach, Fla.

• **Joseph R. Moffat,** superintendent at Chevrolet Motor & Axle Division, General Motors Corp., Buffalo, died August 18 after a brief illness. He had been associated with Chevrolet for 33 years. He was 52 years of age.

MACHINE TOOLS

. . . News and Market Activities

Chasers and Taps Termed Critical

Washington

• • • **In contrast to** a decine in requirements for other cutting tools, a critical situation still exists in the production of die-heads, chasers and collapsible taps, according to the Die-Head, Chaser and Collapsible Tap Industry Advisory Committee.

In order to bring into use stocks of die-heads now lying idle in some plants, the Tools Division of WPB will request the manufacturers to circularize their customers and obtain lists of such idle die-heads in stock. This information will be supplied by WPB to the interested departments of the armed services, which in turn will notify contractors in order that the idle die-heads may be made available when and where needed.

Members of the industry indicated that some additional production of die-heads and collapsible taps could be obtained by subcontracting and by small increases in facilities. They agreed that production was being impeded by the difficulty of retaining skilled workmen. Inexperienced labor was also responsible for an increased ratio of damage to die-heads, some committee members said.

WPB Plans to Uncover Die Head Stocks in Industry

Washington

• • • **In contrast to** the decline in requirements for machine tools and cutting tools, a critical situation still exists in the production of die heads, chasers and collapsible taps, according to the WPB. Requirements of these items remain high because certain off-size thread orders are necessary on replacement parts for such items as models of army rifles which were already in the field. Efforts of standardization will be made in the preparation of new designs of war equipment, and standard specifications for threads are being designated where possible on current items.

In order to bring into use stocks of die heads now idle in some plants, the tools division of WPB requests that manufacturers circularize their customers and obtain lists of such items as are available for stocks. This information will be supplied by WPB to interested departments in the armed services, which will in turn notify contractors in order that the idle die heads may be made available when and where needed.

Additional production of such die heads and collapsible taps can be obtained by subcontracting and by small increases in facilities. Production is being impeded by the difficulty in retaining skilled workmen.

Poor Machine Distribution Injuring Plastic War Production

• • • **An uneven distribution** of machinery within the thermoplastics industry brought to light at a recent meeting of the WPB Thermoplastic Processors Industry Advisory Committee, caused several industry members engaged entirely in war production to say they would be handicapped in completing war orders on schedule, unless more machinery were provided. Others, who for one reason or another decided not to take a large volume of war contracts, now have machinery standing idle because molding powders for civilian products are extremely difficult to obtain.

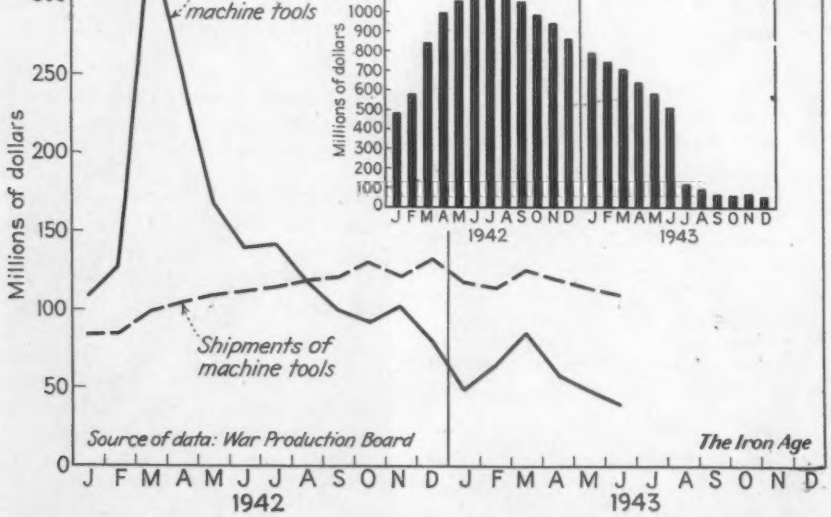
Some of the manufacturers making military thermoplastic items have been successful in renting machinery but now find it difficult to obtain additional molds and other equipment. It was the opinion of some that new equipment should be built for those operating entirely on production of war products capable of handling greater volume.

Opposed to this suggestion was the report from several members that there is more idle equipment in the industry than formerly, and that many operators are retarding the war effort by continuing to work on civilian items. These felt that the Chemicals Division should make certain that new machinery is released only to manufacturers working on war, or highly essential civilian items.

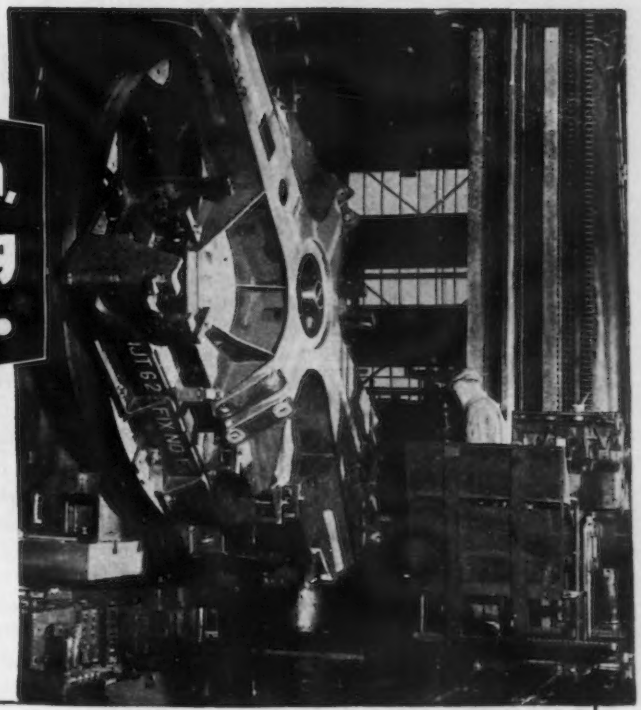
It was proposed also that the WPB investigate problems of requisitioning idle equipment, and equipment operating upon civilian products.

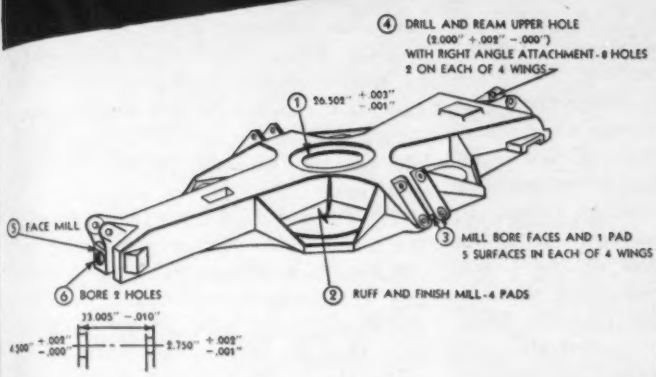
Machine Tool Shipments and Orders on Down Grade

• Shipments of machine tools for July totalled $97,428,000, a decrease of approximately 10.4 per cent in value from the June total of $108,689,000. Net new orders declined to $28,795,000 from the June total of $38,322,000, a drop of 25 per cent. New orders received for July were valued at $41,529,000 and cancellations at $12,734,000. The accumulated backlog of unfilled orders at the end of July was $441,311,000 as against the June backlog of $511,478,000. At the July rate of shipments, the backlog would be eliminated in approximately four and a half months.


BACKLOG OF ORDERS
Millions of dollars
338
1117
Net orders for machine tools
Shipments of machine tools
Source of data: War Production Board
The Iron Age
J F M A M J J A S O N D J F M A M J J A S O N D
1942
1943

How to Tool-up a Tough, Awkward Boring, Drilling and Milling Job . . . .




④ DRILL AND REAM UPPER HOLE
(2.000" +.003" −.000")
WITH RIGHT ANGLE ATTACHMENT - 8 HOLES
2 ON EACH OF 4 WINGS
① 26.501" +.003" −.001"
⑤ FACE MILL
③ MILL BORE FACES AND 1 PAD
5 SURFACES IN EACH OF 4 WINGS
⑥ BORE 2 HOLES
② RUFF AND FINISH MILL - 4 PADS
33.005" −.010"
4.500" +.002" −.000"
2.750" +.002" −.001"

G & L Standard Floor-Type Machine Handles Large Weldment with Ease—Using Both Horizontal and Vertical Tables Simultaneously . . .

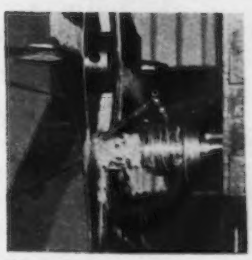
This Giddings & Lewis Floor-Type Horizontal Boring, Drilling and Milling Machine is provided with a combination table, which can be rotated both vertically and horizontally. The horizontal table is used for indexing only, while the vertical table utilizes both indexing and rotary power-feed. With this setup, the large steel weldment is easily machined in only one setting.

In addition to the rotary tables, a G & L Continuous Feed Facing and Boring Head and a right angle attachment are used to simplify the machining of this large, unwieldy part. See operation sequence at the right.

This is an excellent example of how a standard, general purpose G & L Horizontal Boring, Drilling and Milling Machine can be tooled up for production boring, drilling and milling in a single setup. Our engineers will be glad to work with you, either assisting in the selection of the best G & L Machine suited to your work, or studying and recommending tooling best fitted to your particular requirements.

Additional Data covering the complete line of Giddings & Lewis machines and time-saving accessories is included in this catalog. Write for your copy today—please indicate your business connection. Ask for Bulletin No. 93.

SEQUENCE OF OPERATIONS



Operation 1; rough milling with power rotary feed.

Operation 1
Load weldment. Rough mill surface No. 1 with headstock stationary, while weldment is rotated by the vertical table.

Operation 2
Rough and finish face mill 4 pads numbered 2 on drawing.

Operation 3
Finish face surface No. 1 with single point tool and Continuous Feed Facing Head.

Operation 4
Use combination end mill and helical cutter. Slabmill surfaces numbered 3 on drawing. These surfaces are the four bosses of the wings in each of four arms plus a pad between each pair of wings which is end milled in same setup.

Operation 2; finish facing with continuous feed facing head.

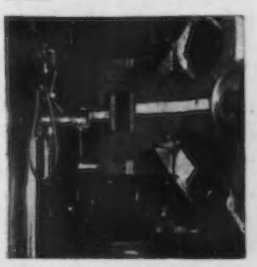
Operation 5
Use right angle attachment. Drill and ream holes numbered 4 on drawing—eight holes, two in each wing.

Index Weldment

The vertical table is indexed so that surface No. 5 is vertical to the floor plate. The horizontal table is then indexed 90° to present surface No. 5 to the spindle.

Operation 6
Face mill surface No. 5.

Operation 7
Bore two holes No. 6, two cuts, rough and finish. First bore is 4.500″+.002″−.000″. Second bore is 2.750″+.002″−.001″.



Operation 4, milling pads with helical end mill.

GIDDINGS & LEWIS MACHINE TOOL CO.
136 DOTY ST., FOND DU LAC, WISCONSIN

NON-FERROUS METALS

. . . News and Market Activities

WPB Orders Beryllium Scrap Segregation

• • • **Because of the shortage** of beryllium scrap, the Mica-Graphite Division of WPB on Aug. 29 has issued supplementary order M-160-a which provides that any person who in the course of manufacture generates 100 lb. or more of beryllium copper scrap must carry out the following Beryllium Copper Scrap Segregation Program set forth in Schedule B of the order.

I. **Segregation of beryllium scrap other than mixed beryllium scrap—(1) By alloy content.** Beryllium scrap (other than mixed) of each individual alloy (for example, nickel or cobalt bearing scrap) shall be segregated from beryllium scrap of every other alloy.

Note: Scrap from plated or otherwise coated material may not be included with uncoated material of the same alloy specifications.

(2) **By form.** In addition to the above segregation on the basis of alloy content, the scrap of each alloy (other than mixed) shall be segregated into four form types:

(i) "Solids from wrought shapes" generated by shearing, clipping, cutting, blanking or similar processes and also defective or rejected wrought beryllium parts.

(ii) "Casting solids" consisting of defective or rejected casting and gates, sprues, risers or similar foundry scrap.

(iii) "Wrought machinings" generated by machining, drilling, boring, turning, milling or like operations on wrought products or wrought parts.

(iv) "Casting machinings" generated by machining, drilling, boring, turning, milling or like operations on foundry products and parts made therefrom.

In no event shall solids and machinings be combined.

II. **Segregation of mixed beryllium scrap by form—(1) Definition.** "Mixed beryllium scrap" shall consist of beryllium scrap in the form of solids or machinings, the alloy content of which cannot be identified, or of grindings, sawings, buffings and other fines and of drosses, skimmings and sweepings.

(2) **Classification.** All mixed beryllium scrap shall be segregated into four classes: Solids; machinings; sawings, and drosses, skimmings, grindings, buffings and sweepings and other fines.

Each of the four classes of mixed beryllium scrap shall be handled separately from each other class of mixed beryllium scrap and from all other beryllium scrap.

III. **General provisions—(1) Official responsible for handling beryllium scrap.** Each person operating a plant generating in any month after June, 1943, 100 lb. or more of beryllium scrap shall appoint a responsible employee to supervise the collection, segregation and handling of all beryllium scrap generated in the plant. The name of such employee shall be forwarded to the Mica-Graphite Division, Washington. No dealer or other person not a regular employee of the plant shall perform any such function except as the WPB may specifically authorize in writing.

(2) **Collection and identification.** Segregation shall be effected at the machine where the beryllium scrap is generated. Separate containers for collection and bins for storage shall be provided for each type of beryllium scrap required to be segregated by this program. All containers and bins shall be clearly marked to identify the alloy and the form of scrap for which they are intended, and they shall be kept clean, dry and in good condition, so that their contents shall be protected from contamination and weather. Each container and bin shall be used only as a receptacle for the alloy and form of scrap for which it is designated and marked.

(3) **Identification of segregated scrap for shipment.** Each unit of segregated scrap shall, upon shipment, be clearly marked or labeled to show the alloy number or the designation "mixed beryllium scrap" where applicable, the form and the plant where generated.

(4) **Obligation as regards subcontractors.** Each person operating a plant as part of his arrangement with any subcontractor to whom he furnishes beryllium copper shall impose an obligation upon, and otherwise make every effort to see to it that, such subcontractor institutes and carries out an adequate beryllium copper scrap collection and segregation program in conformance with this schedule and Order M-160-a.

The order restricts the use of beryllium copper scrap to producers or approved smelters. However, a brass mill may still remelt the scrap generated by it and a foundry may remelt its gates, sprues and risers if so doing the material is not debased or contaminated.

o o o

Magnesium Casting Output Soars

• • • **Production of magnesium castings** has reached a rate three times as great as at the time of the Pearl Harbor attack. Incendiary bomb magnesium castings are not included in the totals, but WPB indicated that these castings have shown large production increases.

Sand castings experienced the largest increase in poundage—from less than 1.5 million lb. in November, 1941, to over 4.5 million lb. a month in the spring of this year.

Both permanent mold and die castings show very large percentage gains since the beginning of the war, although in terms of weight the increases were small compared to that of magnesium sand castings. Permanent mold castings reached a peak of 356,000 lb. and die castings a peak of 274,000 lb. in May of this year, increases of more than 1400 and 400 per cent respectively over prewar production.

Magnesium castings: U. S. production, by type and by month, November 1941—June 1943

(In thousands of pounds)

Month	Total	Permanent Sand[1]	Permanent Mold[2]	Die
1941				
November	1,564	1,487	23	54
December	1,849	1,753	17	79
1942				
January	2,079	1,984	31	64
February	2,195	2,085	36	74
March	2,522	2,398	39	85
April	2,645	2,512	51	82
May	2,683	2,484	81	118
June	2,628	2,411	90	127
July	2,751	2,544	88	119
August	2,974	2,703	143	128
September	3,359	3,018	186	155
October	3,896	3,517	239	140
November	3,784	3,419	219	146
December	3,994	3,588	251	155
1943				
January	4,649	4,156	282	211
February	4,659	4,110	308	241
March	5,307	4,705	337	265
April	5,251	4,734	286	231
May	5,085	4,455	356	274
June	4,665	4,177	263	225

[1] Virtually all heat-treated.
[2] Virtually all heat-treated; does not include incendiary bomb body castings or cast sticks used for powder grinding.

Refiner, Smelter Quotations

(Cents per lb.)

Copper, electrolytic, Conn. Valley	12.00
Copper, electrolytic, New York	11.75
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67
Lead, St. Louis	6.35
Lead, New York	6.50
Aluminum, virgin 99+%, delivered	15.00
Nickel, electrolytic, base refinery	35.00
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Cadmium, delivered	90.00

ALUMINUM, No. 12 foundry grade (No. 2), 13.50c. per lb.; steel deoxidizing grades, 12.50c. to 13.75c. per lb. ANTIMONY, Asiatic, New York, nominal; American, 14.50c. a lb., f.o.b. Laredo, Tex., smelter. MERCURY, $191 to $193 per 76-lb. flask, f.o.b. shipping point or port of entry. BRASS INGOTS, commercial 85-5-5-5 (No. 115), 12.25c. a lb. COBALT, 97 to 99 per cent, $2.11 per lb. BERYLLIUM COPPER, 3.75 to 4.25 per cent Be., $15 per lb. contained Be. GOLD, U. S. Treasury, $35 an oz. INDIUM, 99.5 per cent, $10 per troy oz. IRIDIUM, $165 per troy oz. PALLADIUM, $24 per troy oz. PLATINUM, $35 per oz. SILVER, open market, New York, 44.75c. per oz. ARSENIC, prime, white, 99 per cent, 4c. per lb.

Copper, Copper Base Alloys

(Mill base prices)

Sheet: Copper, 20.87c.; high brass, 19.48c.; low brass, 80 per cent, 20.15c.; red brass, 85 per cent, 20.36c.; commercial bronze, 90 per cent, 21.07c., 95 per cent, 21.28c.; manganese bronze, 28.00c.; muntz metal, 22.75c.; naval brass, 24.50c.; phosphor bronze, grades A, B, 5 per cent, 36.25c.; Everdur, Herculoy, Olympic or equivalent, 26.00c.; nickel silver, 5 per cent, 26.50c.

Rods: Copper, hot rolled, 17.37c.; drawn, 18.37c.; free cutting brass, 15.01c.; low brass, 80 per cent, 20.40c.; red brass, 85 per cent, 20.61c.; commercial bronze, 90 per cent, 21.32c., 95 per cent, 21.53c.; Muntz metal, 18.87c.; naval brass, 19.12c.; phosphor bronze, grades A, B, 5 per cent, 36.50c.; Everdur, Herculoy, Olympic or equivalent, 25.50c.; nickel silver, 5 per cent, 28.75c.

Extruded Shapes: Copper, 20.87c.; architectural bronze, 19.12c.; manganese bronze, 24.00c.; Muntz metal, 20.12c.; naval brass, 20.37c.

ALUMINUM

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. per lb. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c. per lb.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base price for tubing; 30,000-lb. base price for plate, flat stock. Variations from the above gage, size, temper, finish and quantity require extras.

Extruded Shapes: "As extruded" temper; 2000-lb. base price. 2S and 3S, factor No. 1 to 4, 25.5c. per lb.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by the weight per lineal foot. All prices above are subject to factor number range, temper, length, dimensional tolerances and quantity extras.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Variation from the above size, temper, finish and quantity require extras.

MAGNESIUM

Sheet, rod, tubes, bars and extruded shapes are subject to individual quotation. Magnesium Metal Turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c. a lb.

NON-FERROUS SCRAP METAL QUOTATIONS

Copper, Copper Base Alloy

(Current OPA maximum prices, cents per lb., f.o.b. point of shipment, plus premiums for quantities and special preparation.)

OPA Group 1

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25

OPA Group 3

Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1] 6.25[2]
Manganese bronze borings	6.50[1] 5.50[2]

OPA Group 4

Automobile radiators	7.00

OPA Group 5

Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

(Current OPA maximum prices, cents per lb., for less than 1000 lb. lots, f.o.b. point of shipment, plus premiums for quantities and special preparation.)

Plant scrap, segregated

2S solids	9.00
All other solids	8.50
Borings and turnings	
Wrought alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50

Plant scrap, mixed

All solids	7.50
Borings and turnings	5.50

Obsolete scrap

Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For lots of 1000 to 19,999 lb., add 1c. to above prices except for old castings and forgings, pistons free of struts, pistons with struts and old alloy sheet for which there is a premium of ½c. a lb. For lots over 19,999 lb. add 1½c. a lb. to prices listed.

Magnesium

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	8.00

Mixed, contaminated plant scrap

Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

(Current OPA maximum prices, cents per lb., f.o.b., shipping point.)

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Soft and hard lead, including cable lead, f.o.b. point of shipment, deduct 0.55c. per lb. from basing point prices for refined metal.

Nickel

Nickel content 98 + per cent, copper under ½ per cent, 26c. per lb.; 90 to 98 per cent nickel, 23c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞c.
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82–41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Coal Strike Cuts Scrap Consumption

• • • **Scrap consumption** figures released for the month of June by the Bureau of Mines seem to indicate that considerably less metal was melted during that month, a fact attributed mainly to the coal strike. Breaking down the June figures for consumption, about 9000 fewer tons of purchased scrap were consumed, 121,000 less tons of home scrap and about 272,000 tons less pig iron—a total of 402,000 fewer tons of metallics indicated as consumed for the month. Total scrap consumption for June was 4,493,000 tons, according to the report.

Domestic stocks of iron and steel scrap at the end of June approximated 6,916,000 gross tons, representing a very slight increase over the 6,905,000 tons reported on May 31, 1943. This increase was occasioned by a gain of 1 per cent in stocks held by consumers, with suppliers' and producers' stocks declining 5 per cent.

Thus while consumers' stocks on June 30 amounted to 5,683,000 tons compared with 5,606,000 tons at the end of May, suppliers' and producers' stocks were 1,233,000 tons and 1,299,000 tons, respectively. The entire increase in total stocks was contributed by gains of 1 and 3 per cent in stocks of purchased and home scrap, respectively, at consumers' plants. The continued increase in consumers' stocks of purchased scrap combined with the decline in dealers' inventories indicates that dealers are expending every effort to furnish the steel mills and foundaries with a constant supply of this material.

The effect of the strike by the coal miners in June is evidenced by the greatly reduced use of ferrous scrap and pig iron which was at the lowest point during this year except in February, a very short month.

The total consumption of ferrous materials (scrap and pig iron) amounted to 8,732,000 gross tons in June, representing a decline of 5 per cent from the 9,234,000 tons used in May. This decrease was not entirely due to the shorter month, since the average daily melt was 2 per cent lower in June than in May, occasioned by declines of 2 and 1 per cent in the average daily use of purchased and home scrap, respectively; while the average daily use of pig iron decreased 3 per cent.

JUST PLAIN JUNK SOON: These and many other pieces of Axis fighting equipment came into New York harbor recently intact. After inspection at Aberdeen Proving Grounds it will be turned over to scrappies as junk. Large tonnages may come across later to feed American scrap yards and steel furnaces.

BIRMINGHAM—Increasingly affected by a labor shortage, dealers in this area reportedly are showing little interest in purchasing material. Apparently they are taking the position that scrap is of little value when men to process it are not to be had.

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BUFFALO—The scrap market continued dull this week with little activity reported. No arrivals by barge or lake steamer were reported but mills continued to add to their reserves, with the only complaint centering on the quality of offerings. Although expected, no war scrap has come up the state barge canal to date.

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BOSTON—Approximately 600 tons of battlefield scrap has been landed and sold here, part of a rumored 25,000 tons scheduled for Boston. Allotment shipments of shipyard steel are picking up again, and salvaging of street car rails has resumed, although not actively.

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CINCINNATI — The market here has reached a status of extreme quietness so far as trading is concerned, although dealers generally indicate that if they could obtain the material, they could place it very easily with persons now requesting it. This is particularly true among foundries where the request for increased cast scrap has been noted more insistent during the past week. One dealer indicates that although he has purchased scrap from other areas, he has not been able to receive it because the shipper is unable to get the labor to handle it. At the same time, dealers report that country scrap is all but dried up.

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PITTSBURGH — The scrap market is still tight here with all interests buying except possibly one. This latter company is still obtaining scrap from its established source. While there is no shortage at present, dealers are finding a market for all the material they can obtain. In many cases steel companies are melting more scrap than they are taking in.

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NEW YORK — Because of the Labor Day holiday, this week has been especially slow as far as scrap movement is concerned. There is talk of a new scrap drive in Washington to start Oct. 1 and last until Nov. 15. Industrial and household scrap will be sought. Scrap brokers here expect to receive allocations soon for Midwestern mills which generally are larger scrap consumers than those located in the East.

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PHILADELPHIA — Present stocks of scrap in this district are evidently adequate since two plants have been holding up shipments on black and galvanized bundles. Alloy scrap especially Cr-Ni-Mo is almost impossible to sell since order M-24-c permits only those mills making alloy steel to use alloy scrap.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	$16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	.....	12.85	12.85	13.85	14.85	15.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per gross ton at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	15.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED

	Solids, Lb. Cont. W	Turnings, Lb. Cont. W
Type 1	$1.80	$1.60
Type 2	1.60	1.40
Type 3	1.25	1.25
Type 4*	0.125	0.165
Type 5*	0.135	0.115

*Per lb. of scrap material.

BASE PRICE UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

BASE PRICE UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Aug. 31, 1943	Aug. 24, 1943	Aug. 3, 1943	Sept. 1, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Aug. 31, 1943	Aug. 24, 1943	Aug. 3, 1943	Sept. 1, 1942
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For cariots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.00
Foundry coke, prompt	7.50	7.375	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 153-165.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
August 31, 1943	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

. . . Prices of Finished Iron and Steel

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 } Electro tin plate, box	$4.50	$4.50	$4.50												
.75 } Electro tin plate, box	$4.65		$4.65												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢[13]	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton = 2.70¢)						2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
							(Coatesville and Claymont = 2.10¢)								
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.31¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 29,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	†† Hot Rolled, 2300	‡ Hot Rolled, 3100	†† Cold Drawn, 2300	‡ Cold Drawn, 3100
*Philadelphia	$3.518	$4.872[5]	$5.018	$3.922	$4.772	$3.605	$3.666	$3.822	$4.072	....	$7.116	....	....
*New York	3.590	4.613[2]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	6.008	7.158	7.303	8.453
*Boston	3.774	4.744	5.224	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
*Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
*Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
*Washington	3.596	4.841	5.196	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
*Chicago	3.25	4.20	5.234	3.60	4.658	3.55	3.55	3.50	3.75	5.75	6.90	6.85	8.00
*Milwaukee	3.387	4.337[2]	5.272[4]	3.737	4.787[8]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
*Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
*Buffalo	3.35	4.40	4.754	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
*Detroit	3.45	4.50	5.004	3.70	5.909[8]	3.609	3.681	3.45	3.80	6.08	7.23	7.159	8.309
*Cincinnati	3.425	4.475[2]	4.825[1]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
*St. Louis	3.397	4.247[2]	5.172[4]	3.747	4.931[8]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
*Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
*St. Paul	3.51	4.46	5.257[4]	3.86	4.358	3.81[9]	3.81[9]	3.769	4.361	6.09	7.24	7.561	8.711
*Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
*Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.453		4.751	3.703	....	3.553	3.553	3.503	4.43	....	....	....	....
Memphis	3.85	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.75	5.43	5.25	4.30	....	5.25	5.25	3.75	4.50	....	....	....	....
†Los Angeles	4.95	7.15	5.95	4.90	....	4.90	4.60	4.35	5.70	9.55	8.55	10.55	9.55
†San Francisco	4.55	7.55	6.60	4.50	....	4.65	4.35	3.95	5.55	9.80	8.80	10.80	9.80
†Seattle	4.657	6.63	5.707	4.25	....	4.75	4.45	4.20	5.75	....	8.00	....	....

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over: Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. [8] 2000 to 39,999 lb. [9] 400 to 14,999 lb. At Philadelphia galvanized sheets, 2500 more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb.; galvanized and cold rolled sheets, 750 to 4999 lb.; cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lbs.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations.

† Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

†† For zoned cities these grades have been revised to NE 8617-20.

‡ For zoned cities these grades have been revised to NE 9442-45 Ann'ld.

* Base delivered prices according to price zones established by Amendments to RPS 49 including the 3% transportation tax—not including the 6% freight increase of March 18, 1942, rescinded May 15, 1943.

NATIONAL EMERGENCY (N. E.) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40c	8.00	.....	.....
NE 9260	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9262	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30c	$26.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.85	17.00	1.35	27.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.85	17.00	1.35	27.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.85	17.00	1.35	27.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9261	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.....	.....	.....	.....
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.....	.....	.....	.....
NE 9545	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	.....	.....	.....	.....

***Recommended for large sections only. Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; f.o.b. Duluth, billets only, $2.00 higher. Delivered prices do not reflect new per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00
Alloy steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton	$54.00

Shell Steel

	Per Gross Ton
4 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32-in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

GEARED ..TO THE NATION'S WAR ACTIVITIES!

EVER since the outbreak of World War II, Carey Products have aided in America's great battle of production by conserving Fuel and Transportation . . . speeding production of Aviation Gasoline and Synthetic Rubber . . . contributing to the efficiency of Man-power and Machine-power . . . saving metals, lumber and other vital materials in plant construction and maintenance.

If you have a problem in roofing, siding, flooring, insulation, or waterproofing, it will pay you to call the Carey representative. Write Dept. 26 for details.

Carey

ASPHALT-ASBESTOS-MAGNESIA PRODUCTS in the Nation's Service:

HEAT INSULATION: Liberty Ships; Oil Refineries and Synthetic Rubber Plants; Aircraft Engine Plants; Power Plants; Chemical and Food Processing Plants, etc.

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INDUSTRIAL FLOORING AND PLANKING: Docks and Piers; Pontoon Bridges; Government Warehouses, Power Plants, etc.

EXPANSION JOINT AND SUB-GRADE FELT: Airport Runways and Aprons; Roads and Bridges; Aircraft Hangar Floors, Industrial Plants.

ASBESTOS-CEMENT ROOFING AND SIDING: Oil Refineries; Ordnance Buildings and Arsenals; Chemical and Metal Producing Plants.

OTHER ASBESTOS PRODUCTS: Felt for Oil Pipelines; Careyduct for Government Buildings, etc.

THE PHILIP CAREY MANUFACTURING CO.

Dependable Products Since 1873 . . . Lockland, Cincinnati 15, Ohio

TO LUBRICATE YOUR

FORD TRIBLOC

FORD TRIBLOCS withstand abuse amazingly well—but this is certainly no time to abuse anything made of critical materials. Like any other precision-made machine, **FORD HOISTS** will give more efficient service for a longer time if properly maintained. In **FORD HOIST** maintenance, lubrication is perhaps the most important single factor—so here are a few pointers on lubricating **FORD TRIBLOCS.**

- The gear cover should be removed occasionally and a small quantity of suitable graphite grease applied.
- The load chain should be lubricated frequently with a heavy oil, particularly at engaging points of links.
- Load sheaves should also be greased.
- Oil the bearings frequently so that no bearing will run dry and cause excessive wear.
- Oil holes are provided in the **TRIBLOC** at vital points. These should be used frequently.

When given intelligent care, lubricated thoroughly at intervals, **FORD TRIBLOCS** will remain efficient under the hardest usage for a long time. Your **FORD HOIST** can be one of your best friends during this production emergency. Take care of it.

FORD CHAIN BLOCK DIVISION

PHILADELPHIA • CHICAGO
DENVER • LOS ANGELES
SAN FRANCISCO
PORTLAND

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT, CONNECTICUT

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1¼ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller		64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets *(7/16 in. and smaller)*

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 5

Cap and Set Screws

Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	26
Filister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle bars, 100 lb.	2.20
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	62-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

	Black	Galv.
Steel (Butt Weld)		
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
⅛ in.	25	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57
Wrought Iron (Same as Above)		
⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

Giant planes — performing incredible feats in combat service — are built for exceptional duties and are fulfilling them daily. Each part is selected to stand up under the most severe flight and fighting conditions — each has proved itself the hard way.

Here Ampco Metal is doing valiant service as critical parts in engines, propellers, and other aircraft equipment where lives depend on unfailing performance. Where a tough, rugged, wear-resistant metal is necessary, Ampco Metal outperforms other bronzes.

In your Victory program you may need bronzes for exceptional service. Investigate Ampco Metal and gain the pride and satisfaction of "discovering" an alloy that has commando-like toughness. Ask for "File 41 — Engineering Data Sheets." Free on request.

ARMY E NAVY

AMPCO METAL, INC.

DEPARTMENT IA-9 MILWAUKEE 4, WISCONSIN

AMPCO METAL

AMPCO

THE METAL WITHOUT AN EQUAL

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	*$25.50*	*$25.00*	*$26.50*	*$26.06*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	*$31.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$28.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $2 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

Metal Powders

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c.
Copper, reduced, 150 and 200 mesh	20½ to 25⅛c.
Iron, commercial, 100 and 200 mesh	13½ to 15c.
Iron, crushed, 200 mesh and finer	4c.
Iron, hydrogen reduced, 300 mesh and finer	63c.
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh	42c.
Iron, carbonyl, 300 mesh and finer	90c.
Aluminum, 100 and 200 mesh.	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.60
Lead, 100, 200 & 300 mesh,	11½ to 12½c.
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51⅛c.
Solder powder, 100 mesh,	8½c. plus metal
Tin, 100 mesh	58¾c.

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.33
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.59
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.86

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace	*Per Net Ton*
†Connellsville, prompt	$6.50*
Foundry	
†Connellsville, prompt	7.50
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	12.25
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	8.50†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge $7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

Pursuant to OPA Revised Maximum Price Regulation No. 126, effective July 1, 1943, to Aug. 29, 1943, base price per short ton is set at $33 for 70 per cent or more effective CaF_2 content; $32 for 65 but less than 70 per cent; $31 for 60 but less than 65 per cent; and $30 for less than 60 per cent. F.o.b. consumer's plant (1) plus either railroad freight on such shipment from the producer's shipping point to the consumer's plant, or (2) railroad freight on such a shipment from Rosiclaire, Ill., to the consumer's plant, which ever is lower. On and after Aug. 30, 1943, the maximum price f.o.b. a consumer's plant on any shipment of metallurgical grade fluorspar shall be $30 per short ton. Over $30 may be charged provided the producer receives specific instructions from the Steel Division of WPB to the effect that a specific consumer must have one of the higher grades, as provided in Section No. 4 (b).

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

Safe Welding
AT LOWER PRODUCTION COSTS

The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

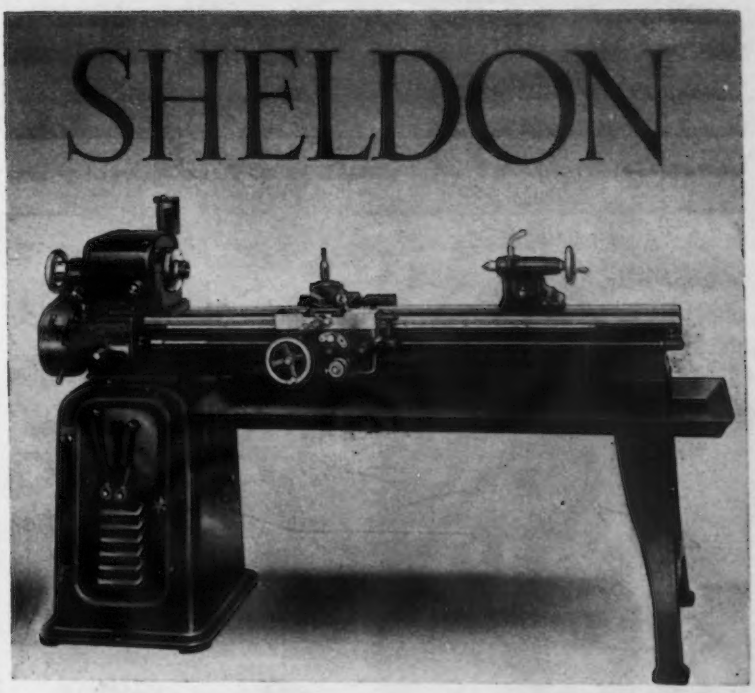
When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.* . . . Price $10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

WELDIT ACETYLENE CO.
641 BAGLEY AVENUE • DETROIT 26, MICH.

SHELDON



BBU-1240 WQ
PRECISION LATHE

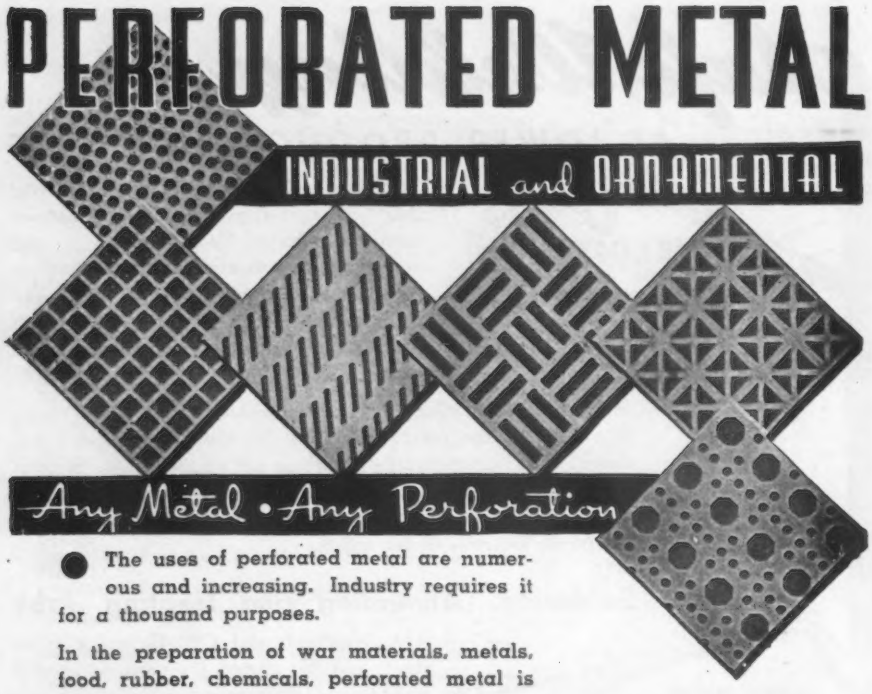
This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round) the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has antifriction bearings. It is so designed that spindle belts operate thru a *standard* 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC.
1240 N. Knox Ave. Chicago, U.S.A.

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



Any Metal • Any Perforation

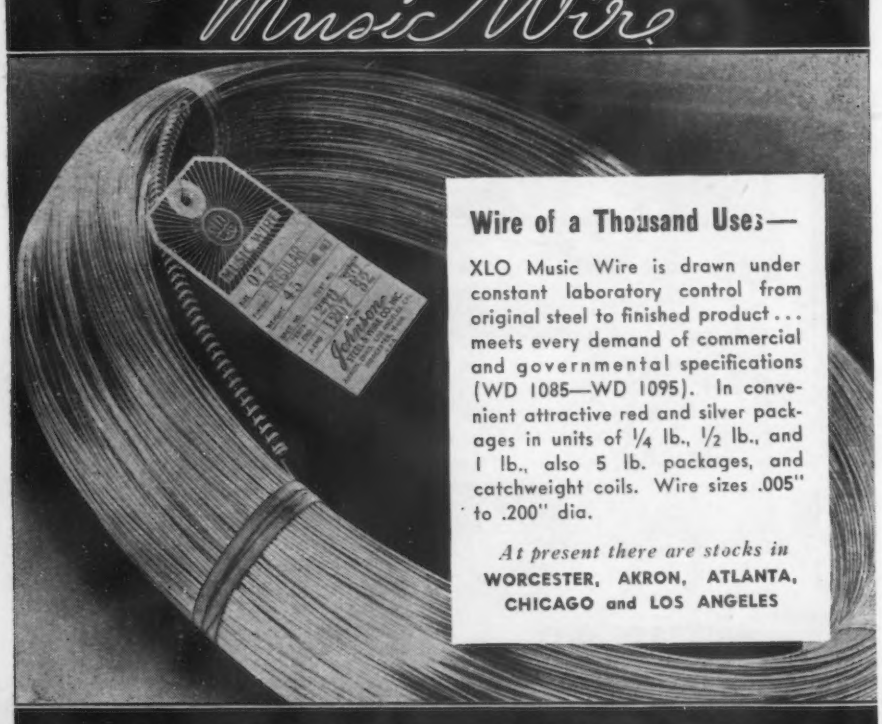
● The uses of perforated metal are numerous and increasing. Industry requires it for a thousand purposes.

In the preparation of war materials, metals, food, rubber, chemicals, perforated metal is required to perform an important role.

The Harrington & King PERFORATING Co.

5657 FILLMORE STREET—CHICAGO 44, ILL.
Eastern Office, 114 Liberty Street, New York 6, N. Y.

JOHNSON XLO Music Wire



Wire of a Thousand Uses—

XLO Music Wire is drawn under constant laboratory control from original steel to finished product... meets every demand of commercial and governmental specifications (WD 1085—WD 1095). In convenient attractive red and silver packages in units of ¼ lb., ½ lb., and 1 lb., also 5 lb. packages, and catchweight coils. Wire sizes .005" to .200" dia.

At present there are stocks in **WORCESTER, AKRON, ATLANTA, CHICAGO and LOS ANGELES**

JOHNSON STEEL & WIRE CO., INC.
WORCESTER ★ MASSACHUSETTS
NEW YORK ATLANTA AKRON CHICAGO LOS ANGELES

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size, 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$36.00	$37.00	$55.50
Less ton	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(*Per gross ton, delivered, carloads, bulk*)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

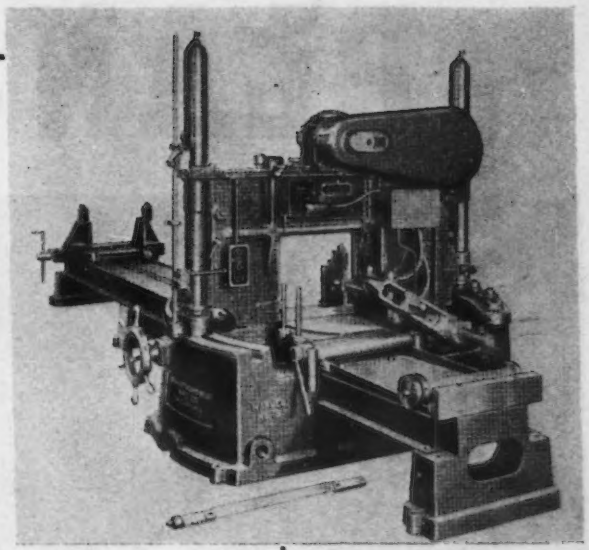
Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

PRICES

Other Ferroalloys

Ferrotungsten, delivered, carlots, per lb. contained tungsten	$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grade, per lb. contained vanadium	$2.70
Special grade	$2.80
Very special grade	$2.90
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%; 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75 per cent, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton	$102.50
Packed	$107.50
Less ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, carlots, f.o.b. Phila., Ohio, per lb. ton lots	9.50c.
Less ton lots	10.50c.

CUTS the Toughest Steels and Largest Sizes *easily*.



This giant hydraulic metal - cutting saw is more than just a larger hack saw. It is a new development in metal-cutting methods that introduces a new principle of metal sawing — the Roll-stroke blade action makes it possible to cut the toughest steels in the largest sizes easily and rapidly. It also permits a simple and efficient, very low pressure Hydraulic Feed System.

Built for heavy work, completely enclosed in heavy housing, this machine will stand up under the rough usage of the average steel mill warehouse and forge shop, where it will speed cutting-off, and reduce material loss.

MARVEL No. 18

Giant Hydraulic Hack Saw

Capacity 18"x18"

Cuts angles up to 45° by simply swiveling upper machine housing.

Write for Catalog

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U. S. A.

Eastern Sales Office
225 Lafayette St., New York

How many BULLETS in a battle?

Sources from the front say it isn't the quantity it's the accuracy. That checks with our ideas about springmaking, too. We work just as carefully on small orders for springs as we do on mass-production lots. There are many springs that may seem to suit your requirement — there's only **one** that meets all conditions of efficient manufacture and performance. Dunbar experience helps to select that spring — and to produce it efficiently and economically.

There's plenty of fight in springs made by

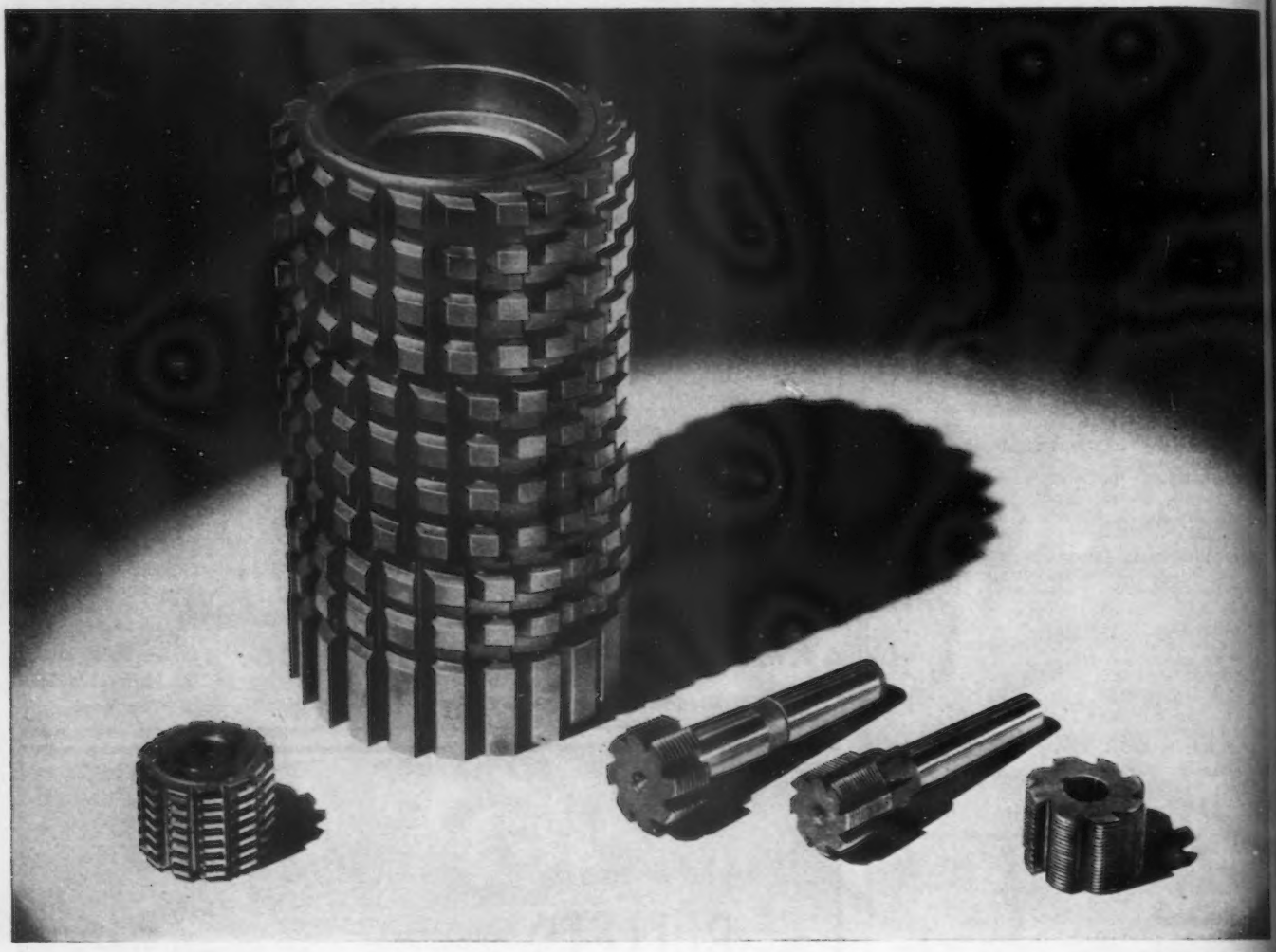
DUNBAR SPRINGMAKERS

SPRINGS WIRE FORMS SMALL STAMPINGS

DUNBAR BROS. CO., Bristol, Conn.

Division of Associated Spring Corporation

PLAN-O-MILL



THREAD MILLING CUTTERS

Years of on-the-job experience—working with production men all over the country as each Plan-O-Mill milling machine was tooled for another job—told Plan-O-Mill engineers exactly what was needed for accurate, economical thread milling.

The result is the Plan-O-Mill Multiple Thread Milling Cutter, now proving its worth in factories and machine shops from coast to coast.

Plan-O-Mill Thread milling cutters are available ground or unground with straight or spiral flutes, in National, Whitworth, Acme, V, and special forms, for use on all types of thread milling machines. For speedy delivery give full details when ordering, including size of cutter; thread form, pitch, and direction; straight or spiral gash, and job description.

MILLING MACHINES PLAN-O-MILL MILLING CUTTERS

PLAN-O-MILL CORPORATION, 1511 E. Eight Mile Road, Hazel Park, Mich.